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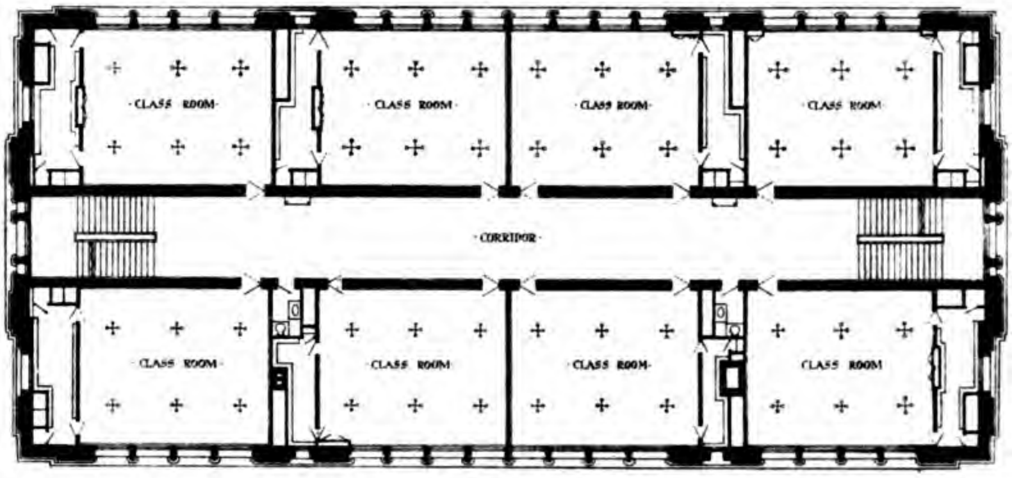

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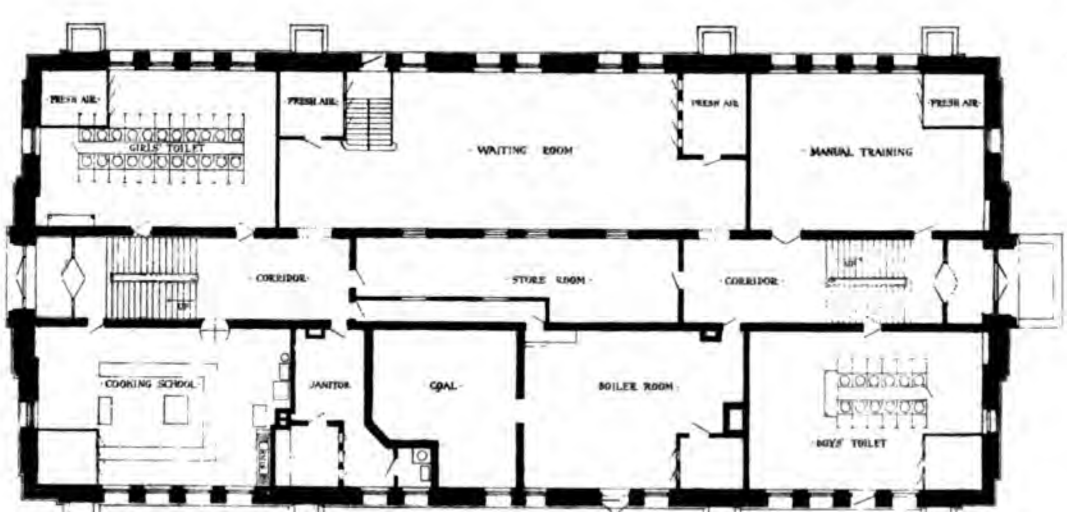

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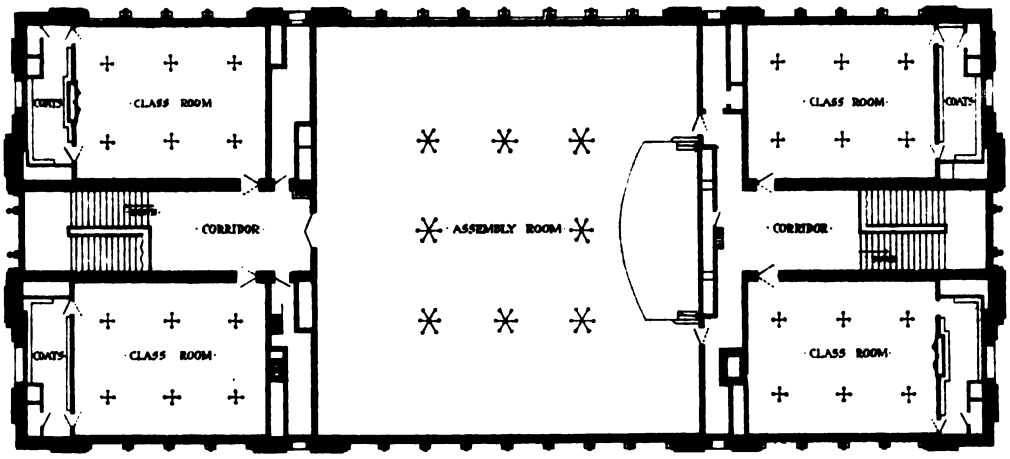

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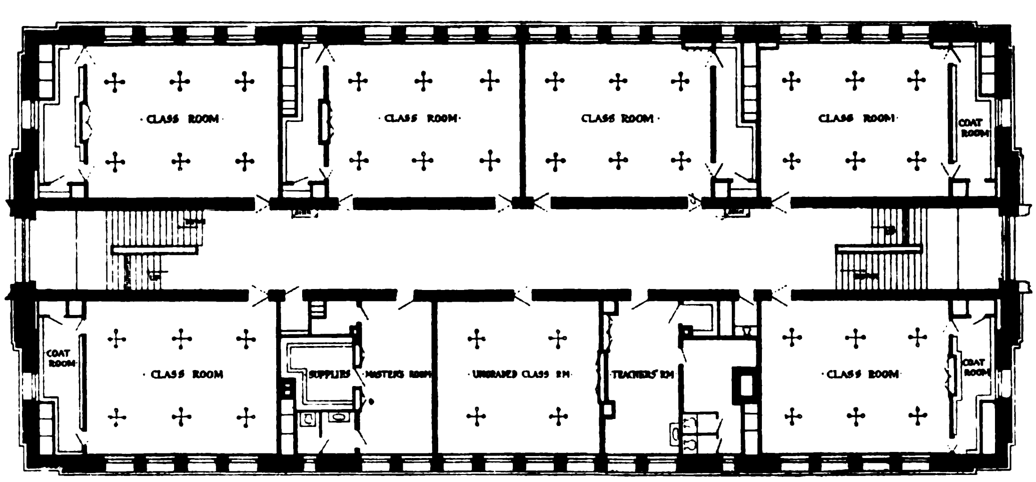

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The American Architect
July 4, 1903.
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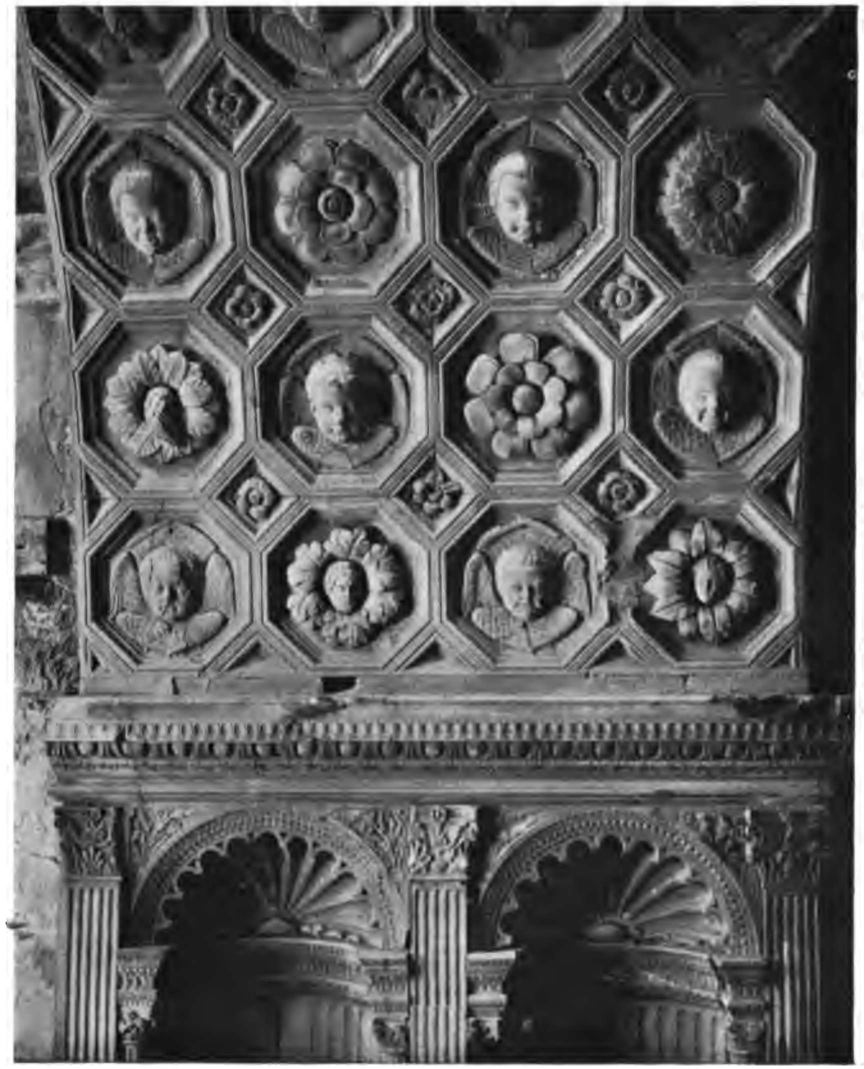
TRIUMPHAL ARCH OF ALFONSO OF ARAGON, NAPLES, ITALY.

Detail of the Stylobate.



Detail of the Intrados.

DETAILS OF THE ARCH OF ALFONSO OF ARAGON, NAPLES, ITALY.

THE AMERICAN ARCHITECT AND BUILDING NEWS

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THE condition of things in the building-trades in New York is serious. The action of the contractors in organizing for defence against the tyranny of the unions has been accepted as a challenge by the union leaders, and strikes have been ordered on all buildings being erected by members of the Employer's Association. The Parks element in the unions seems to be still in control, and bands of walking-delegates, with Parks at their head, march through the city calling off all union men that they find at work on buildings. Fortunately, the struggle cannot last long. So long as the union leaders were able to attack contractors in detail with an overwhelming force, victory was easy, but to deal with the united power of the employers is a very different matter. It is said that about one hundred and fifty thousand men are now on a strike in the city. This would imply that at least half a million people are without means of support in the best season of the year, with the summer rapidly going by. It cannot be many days before the rank and file of the unions will see that the contest is being carried on, at their expense, solely for the benefit of the union leaders, and, in course of time, they will pluck up courage to assert themselves.

A VERY interesting dispute is going on in New York in connection with the recent enactment in regard to tenement-houses, known as the De Forest Act, the most important section of which is one requiring the substitution of water-closets for the privies which still linger in the back yards of multitudes of tenement-houses on Manhattan Island. The tenement-house owners, or some of them, profess to see in this provision a violation of the Constitution of the United States, which declares that no person shall be deprived of life or property without due process of law, and claim to consider themselves victims of illegal oppression; but it is very unlikely that their representations will have much weight with the courts. The city authorities, of course, order the foul privies abolished, not for the benefit of any particular persons, but for the general good, and the necessity for such action does not admit of any doubt. Every other large city in this country equipped with sewers and water-supply comparable with those of New York, adopted this rule long ago; and even conservative Paris, which has only just completed its sewerage system, requires for every house the abolition of the costly and comparatively inoffensive tight vaults which were universal there until within a few years, and the substitution of water carriage. As we have said before, we are sorry that the De Forest law did not require a water-closet for every family, instead of one for every two families. The additional expense of installation would be comparatively small, and the moral and hygienic advantages would be enormous; but it might have been difficult to carry through such a measure, and the better class of landlords, finding that an additional fifteen or twenty dollars for each tenement will provide all with independent closets, are quite likely, particularly if representations are made to them by the friends of the poor, who are now a great host in New York, to make the improvement themselves, especially as the investment would be certain to bring in an enormous interest.

IT seems to us, in studying the accounts of the enforcement of the De Forest law, that the process is unreasonably and unnecessarily long and expensive for all parties. A suit to compel an owner to pull down a privy and substitute a water-closet involves, as every lawyer knows, an expense much greater than the cost of making the change, while it opens the door for appeals and other dilatory proceedings almost without end. Moreover, a single suit of this kind hardly serves as a precedent for the decision of other cases, inasmuch as an infinity of different issues can be raised by an ingenious lawyer. For example, the De Forest law, as we remember it, does not give a very precise definition of what constitutes a legal water-closet; and every owner who wishes to make trouble for the city, and gain time for himself, can demand a long and expensive trial to determine this point. It would have been much better, as it seems to us, to put the matter frankly in the hands of the Tenement Department, where it already is virtually, and authorize the inspectors of the Department to order every house vacated in which the law, after a reasonable time, is not complied with. The certainty of a loss of rents, even for a month, would have more terrors for the refractory tenement-house owner than the prospect even of an expensive and losing lawsuit; and the more summary proceeding would really save a great deal of money to the tenement owners, as well as to the city, besides preserving the lives of the unfortunate children who would die of cholera infantum, in consequence of exposure to stench and filth, while the suits are going on.

ACCORDING to the New York papers, the prices of real-estate in Manhattan, at least, tend to fall. The speculation in lands in New York has been so wild for the past few years that some reaction was, perhaps, inevitable, and the present building troubles, which, while they prevent the improvement of property, do not interrupt the running of interest on mortgage loans, will undoubtedly lead to some sacrifices. We are inclined to think, however, that these will not be very numerous, or very serious. The prospect is that, if the Employers' Association remains firm, labor will cost considerably less after the strike is over than it did last season. Perhaps the nominal scale of wages will not be materially changed, but the suppression of the interference of walking-delegates, the abolition of "foremen," and of the other useless incumbrances which the walking-delegates have saddled on employers, with the knowledge, on the part of the men, that they were being watched by their employers, to see who did a fair day's work, instead of by a "business agent," to see that they did not do too much, should do wonders for the efficiency of labor, and correspondingly reduce this item of cost in building operations. With this prospect before them, even the speculative builders can well afford to pay a year's additional interest on their mortgages, in the confidence that they will more than make it up in the saving in cost of construction.

THE bricklayers of Boston and vicinity have demanded an increase of pay, which the contractors absolutely refuse to grant, so that even such meagre building operations as are now going on, or in contemplation, in that city are likely to be suspended. How long the suspension will last it would be difficult to predict, but we are disposed to think that it will not be very long-continued. We remember, on the occasion of a previous bricklayers' strike in Boston, that bricklayers from New York soon made their appearance, professing to be non-union men, and were put to work, and, under present conditions in New York, it is very likely that this may happen again. Meanwhile, some of the Boston bricklayers are said to be on their way to New York, with their expenses paid out of the funds of the union, to be ready for the time when building-operations begin again. It is probable that, when they are resumed, the walking-delegate and "business-agent" will have retired to the background; and, judging from the settlements made in nearly every labor dispute this season, all over the

country, it is not impossible that the way will be opened for the employment of non-union men. In this case the Boston bricklayers who happen to be there can reciprocate the brotherly attention of the New Yorkers by offering their services in place of them.

MOST people have seen something in the newspapers about the new balloon, with which remarkably successful experiments have been made near Paris. This balloon is the property of two brothers, named Lebaudy, who own and manage an immense refinery. It seems that the director of the refinery, M. Julliot, who is a highly-trained man of science, had taken great interest in the experiments made by M. Santos-Dumont and others in navigating the air, and had amused himself by working out in theory some improvements on the existing systems. His employers heard of this, and with a generosity and sympathy peculiarly French, not only encouraged him to work out his plans, but furnished the money for carrying them into effect in the most admirable manner. Not only did they provide for building the most powerful navigable balloon yet constructed, but, with a forethought worthy of the highest praise, they secured a tract of level land, about two miles long, not far from Paris, enclosed between a bend of the Seine and a circle of hills, which give shelter enough to reduce materially the velocity of the wind at the ground, and thus facilitate the beginning and conclusion of voyages. This tract was fenced in, to keep out idle spectators, and sheds and workshops built within the enclosure. Then the actual construction of the balloon was begun. The most important peculiarity of the Julliot, or Lebaudy, balloon consists in the flat surface formed by the underside of the cigar-shaped aerostat. M. Julliot was convinced that at least one extensive horizontal plane surface was necessary to the proper control of the aerostat, and, for compactness, he decided to make this surface form a part of the balloon itself, stiffening it with cross-pieces, and suspending the car from it, instead of from uncertain attachments to the yielding body of the balloon. In this way he obtained a much more rigid connection between the balloon and the car than has ever been previously secured, and, in consequence, endowed the car with great efficiency as a means of keeping the aerostat horizontal.

IN the details of construction, also, M. Julliot secured a solidity which has never before been seen in balloons of any kind. For the light, but slender, piano wires used for suspension members and braces by other recent experimenters he substituted wire ropes and steel tubes; while the driving helices, of which he employed two, were made of steel plate, about one-twentieth of an inch thick, instead of the silk-covered frames hitherto employed; and were placed close to the car, one on each side, and connected with steel shafts and gearing, instead of being situated far out of reach, as has been the previous practice. The motor itself, a gasoline machine of forty horse-power, was placed under the car, and protected against communication of fire so thoroughly, that, while it was in operation, streams of hydrogen, and of a mixture of hydrogen and air, were directed upon it without effect. The covering of the aerostat itself was also novel, consisting of a thin sheet of india-rubber between two thicknesses of cotton material, varnished over, on the outside, with seven coats of a weak solution of india-rubber in a mixture of benzine and bisulphide of carbon. The material so prepared is very impermeable to hydrogen gas, the balloon, when first inflated, some six months ago, having remained for more than forty days with a loss of only ten per cent in ascensional power; while, for the experiments of this spring, which occupied a period of two months, it was only inflated once, at the beginning of the series of trials, descent being effected by inflating the internal air-balloon which is now used in all flying-machines. To lessen the action of the sun on the india-rubber, which, in thin sheets, is liable to rapid oxidation, M. Julliot painted the aerostat bright yellow, with chromate of lead. This coating, added to the cotton and the india-rubber, made a rather heavy fabric, the weight, complete, being about three-quarters of a pound to the square yard, or nearly a thousand pounds for the entire covering of the aerostat. Possibly, in future experiments, the film formed by evaporating a solution of celluloid in acetone, which is very flexible, and has immense tensile strength, relatively to its thickness, might be employed with advantage. Even with such a heavy aerostat, and with its steel propellers, iron gearing and wire-rope suspensions, the machine has worked wonderfully well. On the eighth day of May it remained in the air an hour and thirty-six minutes, travelling over a course of twenty-five miles, and returning to its starting-place. Seven days later, the balloon started out again, in a wind blowing at the rate of fifteen miles an hour, as measured by the anemometer on the grounds, and sailed about fifteen miles, circling about at pleasure. Some five miles from the experimental ground is a country-place, known as the Château de Rosny. The balloon sailed directly against the wind until it reached the château, taking twenty-six minutes to make the trip. Then, after a pause above the lawn of the château, it started off, and described a circle, coming back to the lawn again. From this point it steered across the Seine, and directed its course for the starting-point, the wind being now behind it. For some reason the balloon began to ascend rapidly, and air was pumped into the interior balloon to keep the machine down. As he did so, a rattle of broken metal was heard, and the valve of the air-pump ceased to work. The aeronaut, who had two passengers with him, decided that it would be safest to descend, without waiting until he reached the experiment-station; and, accordingly, brought the balloon to the ground in a field. There was no one near to seize the anchor-rope, and the balloon, which is furnished with a pointed frame underneath to break the shock of descent, was blown for two or three hundred yards, dragging the point over the ground. Then some laborers caught the rope, and the passengers alighted, without any injury either to themselves or the balloon. Some stakes were set in the ground, and the balloon placed on top of them, and secured until M. Lebaudy's little steam-yacht, which was lying in the river, close by, had towed up a scow, in which the balloon was placed, and brought safe to its shed.

MR. THOMAS D. EVANS, one of the best-known architects in Western Pennsylvania, died at the hospital in Pittsburgh a few days ago from a paralytic shock. Mr. Evans was a Welshman by birth, but had lived in this country since his childhood. He served in a Pennsylvania cavalry regiment throughout the Civil War, suffering a severe wound, for which he was treated in the same hospital in which he died forty years later. After the war, he studied architecture with the firm of Barr & Moser; and, in 1871, began practice on his own account. He was very successful in business, designing many of the principal buildings in and about Pittsburgh, and was, at the same time, highly esteemed by his professional associates. He was for some time President of the Pittsburgh Chapter of the American Institute of Architects, and had been for many years active in the affairs of the Institute. He leaves three young children, doubly orphans, their mother having died about five years ago.

THE mosquito has made his appearance, probably for the first time, in the Massachusetts courts. The New England Brick Company, which has for sixteen years been digging out clay in the town of Belmont, and making it into bricks, recently bought six acres of land adjoining its present property, with the intention of digging additional clay-pits in it. The town authorities, however, brought suit for an injunction to restrain the Company from extending its works, under the statute relative to offensive trades, on the ground that the clay-pits, in which water always stands, will become breeding-places for mosquitoes, and, in consequence, will be the means of spreading malarial disease among the inhabitants. The court in which suit was first brought refused to grant the injunction, on the ground that "if the plaintiff's claim were to be allowed in every case, every quarry and brick-yard in the State would be permanently closed." This does not seem a necessary consequence of granting the petition of the town against the extension of the works complained of; but there is, at least, common-sense in the view of the court. The case is to be appealed, but, meanwhile, a compromise might, perhaps, be effected by means of a contract between the town and the brick company, requiring the latter to keep all its clay-pits, new and old, covered with petroleum during the mosquito-breeding season. This, so far as our present knowledge of the subject extends, would effectually suppress the mosquitoes and such malaria as they might be responsible for from the whole plant; and the town would be better off than it is now. If we were interested in the town government, we should be inclined to add a condition, that all the clay-pits should be fenced around, to prevent children from falling into them, as the water in them is usually deep, and many people, straying on their slippery banks, have been drowned.

THE ARCH OF ALFONSO OF ARAGON, NAPLES.

THE pretty monument which is known under the name of the Triumphal Arch of Alfonso of Aragon is one of the least known at Naples. Immured between the two massive towers of the Castel Nuovo, concealed by structures which surround it and which bury this old castle, constantly hidden by scaffolding, for ruin is ever threatening, it ordinarily escapes the notice of the hurried tourist. And yet to the merit common to all the structures erected during the golden age of Italian art it adds the value of a document which is almost unique in the history of the Renaissance at Naples. Its general lines are harmonious, its style, except some slight details, is of the purest, and the multiplied ornaments with which the architects of the fifteenth century enriched it can be classed among the most beautiful specimens of the sculpture of the time. They bear the purest and clearest imprint of the principles enunciated by the creators of modern art, principles too often abandoned by their pupils.

Every one knows now under what conditions the Renaissance had its birth in Italy, at the time of emerging from the sterile and mournful period of the Middle Ages; but while, at the closest possible range, the slightest phases of this phenomenon have been studied so far as concerns Tuscany and Umbria, provinces in which the greatest artists of those memorable times had the fortune to be born and find enlightened patrons in the rulers of the smallest of courts, there has not been studied with much care the artistic movement which had its being almost contemporaneously in other parts of the Peninsula. The Kingdom of Naples is one of these sections. Less rich, it is true, than the three grand divisions of Central Italy, Tuscany, Umbria and Latium, in the matter of works of art, its finest monuments do not reach the degree of magnificence, grandeur and perfection which are so frequently encountered in Florence and Rome. The artists who lived on the shores of the Gulf of Naples were not encouraged with the same generosity, nor stimulated by the same currents of admiring popular applause as favored their brothers on the banks of the Arno and the Tiber, but they, nevertheless, produced a large number of remarkable works.

Detail of Attic Sculptures.

Naples, in Tommaso degli Stefani, of whose paintings a goodly number still exist, had a contemporary and rival of Cimabue's. They tell the story that King Charles of Anjou, who was present in Florence at the time when there broke out the flood of enthusiasm which was produced when Cimabue had finished and exhibited his famous "Madonna" in the Rucellai Chapel, preferred to the Florentine painter his own subject, Tommaso degli Stefani; but to-day Cimabue's superiority is well recognized. Moreover, it was inevitable, fated, as it were, that the fecund inspirations and the new birth must come from Tuscany. The successor of King Charles, Robert of Anjou, about the year 1325, invited Giotto to come and paint in Naples, and here was the point of departure. Giotto left in the capital of the Angevins a line of pupils among whom we find Colantonio del Fiore, a painter still held in honor in our own day, and he, without meaning it, caused Neapolitan painting to make great progress. The matter is so touching that one cannot avoid telling the tale in a few words. A young locksmith had just fallen madly in love with the daughter of Colantonio, and succeeded in inspiring an equal passion on the part of the young girl; but what could sustain an humble artisan in the hope of obtaining in marriage the daughter of one of the greatest artists of Naples, one whom the court itself treated not as a bourgeois, but as a gentleman. Besides, Colantonio had formally declared that he would accept as a son-in-law only a painter of merit, and it was just this demand which bestowed on the Neapolitan school one of its masters, for the locksmith, Antonio Solario, undertook long trips through Italy, sojourning in the studios of the best painters, and applying himself unceasingly to the study of art, and so well that nine years were enough for him to deserve the hand of the daughter of Colantonio and to obscure even the glory of his own father-in-law. Better known under the sobriquet of "il Zingaro," he is to-day still considered as one of the great painters of the fifteenth century.

Let us also mention Filippo Tesauro, whose frescos excited in Luca Giordano, another famous Neapolitan, and in Antonello da Messina, the liveliest admiration. The latter, endowed with exceptional intelligence, as is the case with many Meridionals, had the great merit of having imported into Italy the methods of oil painting which Jean Van Eyck, yielding to his persistency and flattery, at length revealed to him.

But the interior situation of the Kingdom of Naples did not become really favorable to the development of the fine-arts until towards the last half of the fifteenth century. In 1442, the Angevin kings had to abandon their throne to the King of Aragon and Sicily, Alfonso I, whose advent marked the end, or at least the suspension, of the troubles and sanguinary conflicts to which during centuries the succession to the throne of Naples had always given rise. Alfonso, it is true, was a conqueror as sensitive to the voice of ambition as were his rivals, but he considered the acquisition of Naples as his last conquest, and showed himself disposed to inaugurate an era of peace and progress. Besides, he had for this city a marked predilection. He made it his usual place of sojourn in preference to his other residences in Aragon, Catalonia, Sicily, Corsica and Majorca, giving himself up entirely to the cause of order and to the prosperity of his new estates. All this drew towards him the lively affection of his subjects, whose apprehension of becoming simply tributaries of the Kingdom of Aragon had been sovereignly distasteful. So, to allay these apprehensions, Alfonso, on his entry into Naples, obtained from them, for his natural son Ferdinand the title of Duke of Calabria, ordinarily reserved for the heir to the throne.

In the assembly composed of all the nobles of the kingdom, the last traces of disorder caused by the change in dynasty were at length effaced. Yet, perfect calm did not reign until the day when Pope Eugenio IV granted absolution for his conquest to the conquerer of the Angevins, and the fine-arts and letters only definitively took their spring about the year 1447. Alfonso of Aragon in that year had the joy to see ascend the pontifical throne a friend of writers and artists, the Cardinal of Bologna, Parentucelli, a man of a sweet and pacific character, whom the conclave elevated to the supreme dignity of the tiara with the purpose of offering a glorious example of the triumphs of personal merit. This pope, who took the name of Nicolas V, had, among other claims to merit, that of having entrusted to Fra Angelico the decoration of his oratory in the Vatican, the chapel of SS. Stephen and Lawrence, that delicious sanctuary whose painted decorations do not pale under the close vicinage of Raphael's frescos in the halls and galleries which surround it. Nicolas, nevertheless, was only the son of a poor doctor of Sarzana, and had slowly mounted the first steps of the ecclesiastical hierarchy; then, in a single year, he became bishop, cardinal and pope. As he succeeded on the throne of St. Peter a man restless, blundering and quarrelsome, a radical change was at once perceived throughout all Italy; for while he made treaties with the Florentines, the Venetians and the Milanese for the conclusion of peace and succeeded in effacing even the remembrance of a too famous schism by making the anti-pope Felix V his first cardinal, he prepared, by gathering about his throne the best artists of the epoch, the grand artistic movement which made Rome at the commencement of the sixteenth century the centre of the Renaissance.

It is he who, to afford a place for holding the consistoires and pontifical congregations, caused to be built that portion of the Vatican where are found the *stanze* of Raphael; to-day, even, there can be noticed in some of these halls the superposition of the phases which the Renaissance passed through, from the frescos of Angelico and the ceilings of Perugino up to the compositions of Raphael, Michael Angelo and Giulio Romano, from the time of Nicolas V down to those of Julius II and Leo X.

Like the other cities of Italy, Naples wished to have its own artists, and began to enrich itself with monuments: under the direction of King Alfonso and the rich nobles who followed his example, palaces were built in the city and villas in the environs; Gothic styles, so ill adapted to satisfy the local taste and so foreign to the beautiful Neapolitan sky, ceased to inspire the architects. The fear of civil discord having disappeared, we find once more showing themselves the beautiful forms of Classic art; porticos were reared on sites formerly occupied by drawbridges and ramparts; fountains embellished the places which had only seen barricades and bastions. And this movement extended to all the fine-arts and to literature; the impulse which they received was so strong that paganism, resurrected through the restoration of the cult of beauty, succeeded in making a breach in the religious ideal and the physiognomy of the city changed rapidly.

In fact, what can one see here, if it be not the consequence of a radical change in the life and customs, in the transition which substituted wide sculptured porches for the fortified doorways of the mansions of the Middle Ages, which transformed pointed windows and loop-holes into broad rectangular bays surrounded by sculpture,

Detail of the Second Order.

crowned by ornamented cymatia, and surmounted by elegant pediments? The houses took on a hospitable air because men's minds became less rude, because they experienced an irresistible need of peace, and light and air.

We may, perhaps, return to this period which is so interesting in the history of architecture, and tell the story of other monuments which Naples saw arise at this time. It is time, however, to turn to the triumphal arch of Alfonso of Aragon, which we can only study as it deserves after thus running an eye over the times which saw its erection and the causes which determined its construction.

Vasari, who is still the greatest historiographer of the arts of Italy, but who leaves much to desire in the way of exactitude when he deals with other artists than those of Tuscany, especially when he undertakes to trace the biographies of Venetians and Neapolitans — Vasari, I say, names Giuliano da Majano as the author of the Arch of Aragon. Now, this celebrated Florentine sculptor and architect was, in fact, summoned to Naples by King Alfonso, for whom he designed the villa of Poggio Reale, an edifice which the two Donzelli, Neapolitan painters of note, decorated with frescos, and of which the writers of the seventeenth century speak as a most delicious spot, but which now exists no longer. It is equally true, as Vasari affirms, that Giuliano da Majano "designed with beautiful and original invention many fountains for the city of Naples and for the palaces of its nobles," and that there may properly be attributed to him the bas-reliefs of the Porta Capuana; but, as we shall see farther on, there is no evidence that we owe to him "the marble door of the castle, in the Corinthian order, with an infinity of figures, to which he gave the form of a triumphal arch, whereon are represented in sculpture the mighty deeds and victories of King Alfonso."

Several authors, on testimony that is somewhat vague, have asserted that the arch in question was erected toward the end of the fourteenth century, but it appears with sufficient clearness from the little historical digression which we have just been making for the sake of discovering its reason that this hypothesis is incorrect. A certain number of years were needed to prepare for the passage from the archaic style to the modern style, and, moreover, it was only a year after his entry into Naples, June 14, 1443, that Alfonso obtained the investiture from the pope and became in fact a sovereign — for the kingdom which he had conquered was tributary to the pope. Besides, several years were necessary to gather about him the Italian and Greek humanists and artists who were to prepare the Neapolitan Renaissance, a considerable work, for the Spanish and French nobles, who, up to that time, had governed Naples, were conspicuous for their profound ignorance, and would have thought it derogatory to their rank to have devoted themselves to study. So one can assert safely that the Arch of Aragon was not begun before the year 1445.

As we have said above, it is placed between two of the towers of the Castel Nuovo, an ancient edifice which was falling in ruins at the time of the advent of King Alfonso, and which it was necessary to rebuild in large measure. The architects charged with directing these works did not depart in any degree from the rules of Gothic art, but when the elegant façade and delicate arcades of the arch of triumph were seen to be rising it was a real revelation. The new art enraptured Naples; the breath of classicism had dissipated the gloomy inspiration of the ancient architects.

How did any one ever think of imprisoning a work of art so fine and delicate as this in a re-entrant angle of the Castel Nuovo? This is how the Neapolitan historians explain it: On February 2, 1443, the elect of the Neapolitan people, assembled solemnly in the Church of San Lorenzo Maggiore, decided to give proof of their gratitude and exhibit their attachment to the King of Aragon by erecting to him a triumphal arch in front of the cathedral. But, as to do this it would be necessary to tear down the house of a valiant veteran, they were forced to look about for another site, and after much disputation it was decided to transform the heavy portal of the Castel Nuovo into a commemorative monument.

The first impression that one experiences on seeing this arch is one of scorn; one can hardly contemplate without a feeling of chagrin the state in which this monument now is, in a close passage, between two dungeon towers which seem about to crush it, befouled by the contact of a house with leprous walls, and dishonored by vegetation which here and there conceals its cornices. It must also be noted that the crowning portion of the structure, terminated by two masks of clumsy make, bordered by a garland of doubtful taste, and a tympanum in which are enthroned two rivers sculptured by an artist of mediocre talent, is, as a composition, featureless and vulgar, an imitation of the works of the Roman decadence, and "swears at" the rest of the structure. Certain critics consider the upper order of the monument, composed of four niches separated by little fluted pilasters, as a superstructure added in a later epoch, but, in my opinion, they are wrong when they assert it to be of doubtful merit; in reality, it is the neighborhood of these two enormous towers which crush this graceful story, very well placed in its lightsomeness at the summit of the structure.

The Arch of Aragon is built entirely of fine white marble. On carefully examining the general design, a practised eye can perceive certain faults in the disposition, some uncertainty, some mistakes in proportion, which are very pardonable if one thinks of the difficulties which hampered the architects forced to insert their structure in a wall-panel extremely ill-placed, when they had really been imagining that their work was to be erected in an open space before the cathedral; and everybody knows how difficult it is for an architect to adapt his design to conditions so changed as these. One might, also, blame the authors for having made use of ornamental subjects hardly discreet in the golden age of architecture; but it must be recognized that a more beautiful composition could hardly have been designed in so ill-omened a place; so we must agree that they skilfully surmounted their difficulties.

In the first place, they had to break with tradition in order to give their monument enough height, and instead of making it an ordinary triumphal arch convert it really into a façade. The arch proper is composed of two chief orders, of which the first forms the doorway, properly so-called, while the second repeats in less elongated proportions the general lines, the one being separated from the other by an attic consisting of three high-reliefs and an entablature.

The first order is in the Corinthian-Composite style, enriched with sculpture at the base, on the uprights, and on the frieze, on the midst of which are detached in Latin letters the following inscription: "*Alphonsus Rex Hispanus Siculus Italicus Pius Clemens Invictus.*" At the right, the frieze is decorated with a group of dancing children, and, at the left, with children bearing garlands. This order rests on a stylobate whose proportions and ornamental details have been much admired, and of which the illustrations herewith enable one to remark the astonishing perfection of the work, which; as we have already said, must be considered as one of the first works produced in the Renaissance. The necessity of using the least resources to augment the height of the monument suggested to the architect the idea of doubling the stylobate, dividing it into two parts separated by a thick cord representing a garland of oak-leaves and acorns, and placing it upon the contra-sub-basement, which only gives the more relief to the portions of the structure which it supports. Above, the arch of the first order is crowned by the escutcheon of the house of Anjou. The composition of which this escutcheon forms a part, making a centre of it — the remaining space being filled by two griffins, each holding a cornucopia — is admirably conceived.

Detail of the Main Frieze.

The central composition of the attic, in high-relief, has two great merits, the skilful disposition of the figures and the perspective of the background, which would be enough to determine the age of the monument and whose perfection would have been precocious even in the first half of the fifteenth century. This composition represents

the triumphal entry of King Alfonso I of Aragon into Naples. Four mounted trumpeters, in the right-hand lateral panel, open the line of march. We next see groups of dignitaries and nobles, squires and pages. One of the finest groups is that of the nobles and magistrates, treated with infinite care in the least details. Horses harnessed four abreast, guided by a beautiful Victory, who nevertheless reveals the influence of the archaic style, drag a chariot on which the king is seated under a dais. And finally, the rear of the procession is brought up by a group of the populace which fills the left-hand panel. In all this work one can only praise the good arrangement and harmonious *ensemble* of these groups of personages, the sureness of the foreshortening and the perspective. The background of the scene is occupied by a building of the Composite order. All the high-reliefs are in several fragments, in which the architectural lines of the background do not always perfectly agree, a condition of things which proves that they were executed, after the designs of the architect, by several artists.

The second order is a lower one, the vertical member of the opening being almost crushed by the superimposed arch, but the general effect is largely corrected by the four elegant fluted columns which support the frieze. It is alleged that the central bay was intended to receive a sculptured group, and it is even alleged that the subject of this group was to have been King Alfonso, crowned and seated upon his throne; but this is far from being satisfactorily proved, without taking into account that the introduction of a vast subject at this spot might have had the effect of overloading and rendering heavy the general aspect of the façade. Doubtless, this hypothesis was suggested on seeing the statue upon the left-hand side which has no corresponding statue to balance it on the right. In the spandrels of the arch are two sculptured Fames bearing wreaths: one of the two has been damaged by a cannon.

The most interesting part of the arch is, from the point-of-view of architectural ornamentation, the interior of the archway of the

Detail of the Stylobate.

lower order. The vault, in the middle of which is reproduced the escutcheon of the house of Aragon sustained by two genii, is divided into octagonal compartments containing alternately the laughing heads of angels and rosettes. Upon each side, we see, below the springing of the vault, a little story composed of two arcades very similar to those which, to the number of four, are strung along the upper portion of the façade, and of which one can only approve the ornamentation, which is as rich as it is delicate. These niches, the arrangement and design of which recall those of the Arch of Janus at Rome, were intended to contain statues, but it seems that the architect's scheme never went any farther than the design. Below these niches come high-reliefs which form, perhaps, the two most beautiful bits of the entire monument. Here, again, the perspective is perfectly treated and the taste displayed is of the purest. Save for a little stiffness in the lower parts of the figures, the attitudes are perfectly easy and have a gracefulness worthy of remark. The faithfulness of the execution of the costumes of the warriors, of which the least details are carefully reproduced in marble, make these two high-reliefs historical documents of great price. That upon the right is attributed to Isaiah of Pisa, while that on the left, the finest one, is credited to Andrea dell' Aquila.

In the lower portion, between the two high-reliefs which we have just spoken of and the sub-basement, the two coupled friezes of the stylobate continue to develop their rich ornaments without repetition. Here are infants of graceful poses and laughing faces, who support garlands on which masks alternate with mythological subjects.

Finally, there must be noted, in the composition which finishes the corner of the stylobate, a circular medallion, placed immediately beneath the cornice, in which is presented in low-relief the head of a man crowned with olive-leaves. The presence of a portrait among the ornamental motives leads us to suspect some allusion to the author of the monument, such as the ancient artists almost always never failed to make, and to see in it the author's own portrait.

Now, who is the architect to whom must be attributed the paternity of this beautiful Neapolitan monument? Vasari, as we have said, mentions it as one of the works of Giuliano da Majano, but this assertion is of no great value, for Giuliano, born in 1439, had hardly reached the age of discretion at the time of its construction. They have even gone so far as to pretend that the architect in question was none other than Giovanni Pisano, who had come from Florence in 1266 in the suite of Charles I of Anjou, but that the monument was actually finished under the oversight of Masaccio. We have already noted that the probable date of erection excluded, *à priori*, the collaboration of Giovanni Pisano and Masaccio.

Several writers have attributed it to a Milanese, Pietro di Martino, who died at Naples in 1470, and upon whose epitaph it was inscribed that he took a part in these works. Certain contemporary documents corroborate this assertion, but prove that the works which were entrusted to him really consisted of certain sculptures, at the time everything else was practically finished; besides, di Martino was working in 1450 on the cathedral at Orvieto; in 1452 and 1454 he was at Rome, and it is only in one document, dated 1458, that he is found mentioned for the first time as being in Naples, in company with Isaiah and Antonio da Pisa, Andrea dell'Aquila and Paolo Romano, all of whom worked upon the sculptures of this arch of triumph.

Quite recently, a new attempt has been made to divine the name of this mysterious architect, and an hypothesis has been formulated which seems destined to be very soon considered as a certainty, and that is that the author of the structure which concerns us was Leon Battista Alberti.

This illustrious Florentine architect, issue of a noble family, flourished at the time when the monument at Naples was built and left a great number of works on fine-art in Latin. Vasari in several places speaks of his studies in perspective and mentions his sojourn at Rome, in the time when Nicolas V, the pontifical friend of the arts, was enriching the Eternal City with many monuments. At Rimini, in 1444–46, he built for Malatesta a temple whose style, imitating antique triumphal arches, affords striking analogies with this Arch of Aragon, made after the same models. One can, besides, remark in almost all Alberti's works that he sometimes made very little of the practical difficulties against which men of his craft often blundered, such little defects as those which we have noted in beginning our description.

But there are even stronger arguments than these simple deductions. Leon Battista Alberti, at the end of one of his works written in 1435 on the subject of painting, a work which he dedicated to his friend Filippo Brunelleschi, besought painters who might have had reason for applying the instructions contained in this volume to paint his portrait upon their compositions. It appears that it was one of his greatest weaknesses, one which he held to enormously, to see his features reproduced in the decorations of the monuments which he caused to be built. At Rimini, in the Temple of the Malatesta, there can be seen a medallion containing Alberti's portrait seen in profile and in front view, surrounded by a crown of olive, a medallion which is almost identical with that which we have noted on the stylobate of the Arch of Aragon.

And, finally, when we recall that eminent architects were very rare in Italy in the middle of the fifteenth century, a period when simple constructors and stone-cutters received the commission for monuments, if we recall that Alberti enjoyed a reputation which could not but have come to the ears of Alfonso, one may very well admit that the arch of triumph erected in honor of the king was his work.

What is the present state of this fine structure? Have not the ages which it has seen succeed one another made any attack upon its beauty? Let us confess at once that it is in a deplorable condition and afflicts all those who have any feeling for the fine-arts. Also, it it is very little known: quite apart from its position, which renders access difficult, it is concealed by scaffoldings, since for a long time ruin has threatened it. When Gonsalvo bombarded Naples in 1515, several shot struck this monument and shattered it seriously: it was then necessary to replace one of the columns of the lower order by a masonry pillar. Earthquakes, which are so frequent at the foot of Vesuvius, the carelessness of Governments which succeeded one another at Naples after the reign of Alfonso I, and certain works of restoration carried out in despite of the recommendations of good sense have resulted in reducing the monument to a pitiable estate. But there is worse yet: the military arsenal, whose work-shops are placed in the immediate vicinity, discharge through numberless smoke-stacks a heavy smoke impregnated with acid gases which the wind bears against the face of the arch, to such a degree that the ornaments are in a great part calcined, as it were, and crumble under the touch.

Is it necessary to insist on how dangerous a condition of things this is and the mournful consequences which may result? The Arch of Alfonso of Aragon is of priceless value for the history of the Renaissance at Naples; it also has importance as an historical monument, seeing that its erection recalls one of the grand events in the history of Italy. But the difficulty is that the country possesses too many artistic treasures; its monumental patrimony is enormous, while its financial resources are limited, hence the impossibility of providing money for a scrupulous safe-guarding of all the treasures scattered about the peninsula. H. Mereu.

The By-products of Forestry.—In the Prussian State forests the by-products have been as high as seven per cent of the total income.—*Exchange*.

DISCHARGE OF EMPLOYÉ BECAUSE OF MEMBERSHIP IN LABOR ORGANIZATIONS — CONSTITUTIONALITY OF STATUTE.

STATE *ex rel. Zillmer, Sheriff, vs. Kreutzberg, Supreme Court of Wisconsin,* 90 *Northwestern Reporter, page* 1098.

This case arose under chapter 332, laws of Wisconsin, 1899, which forbids the discharge of employés because of membership in any labor organization. Louis J. Kreutzberg had discharged an employé because of his membership in a labor organization and was arrested and committed for trial. He sued out a writ of habeas corpus against the sheriff, claiming that this act was unconstitutional, violating the provisions of the constitution of Wisconsin. These provisions relate to the right of individuals to life, liberty and the pursuit of happiness and declares that no person shall be deprived of life, liberty, or property without due process of law, this last provision being also found in the fourteenth amendment to the Constitution of the United States. The Superior Court of Milwaukee County held that the law was unconstitutional as claimed, and ordered the discharge of Kreutzberg from imprisonment, whereupon the sheriff of Milwaukee County and State of Wisconsin brought the case before the Supreme Court on a writ of error. The Supreme Court affirmed the decision of the court below, holding the statute to be in contravention of the constitutional provisions referred to.

From the remarks of Judge Dodge, who gave the opinion of the court, the following is quoted: —

"Free will in making private contracts, and even in greater degree in refusing to make them, is one of the most important and sacred of the individual rights intended to be protected. That the present act curtails it directly, seriously and prejudicially, cannot be doubted. The success in life of the employer depends on the efficiency, fidelity and loyalty of his employés. Without enlarging upon or debating the relative advantages or disadvantages of the labor-union, either to its members or to the community at large, it is axiomatic that an employer cannot have undivided fidelity, loyalty and devotion to his interests from an employé who has given to an association right to control his conduct. He may by its decisions be required to limit the amount of his daily product. He may be restrained from teaching his art to others. He may be forbidden to work in association with other men whose service the employer desires. He may not be at liberty to work with such machines or upon such materials or products as the employer deems essential to his success. In all these respects he may be disabled from the full degree of usefulness attributable to the same abilities in another who had not yielded up to an association any right to restrain his freedom of will and exertion in his employer's behalf according to the latter's wishes. Such considerations an employer has a right to deem valid reasons for preferring not to jeopardize his success by employing members of organizations. A man who has by agreement or otherwise shackled any of his faculties, even his freedom of will, may well be considered less useful or less desirable by some employers than if free and untrammeled. Whether the workman can find in his membership in such organization advantages and compensations to offset his lessened desirability in the industrial market is a question each must decide for himself. His right to freedom in so doing is of the same grade and sacredness as that of the employer to consent or refuse to employ him according to the decision he makes.

"The nearest parallel we have found to the act in question are laws enacted in Missouri and Illinois, nearly identical with our law as it existed before the amendment of 1899, namely, making criminal attempts to coerce employés against membership in labor-unions, by discharge or otherwise. In State *vs.* Julow, 129 Mo. 163, 31 S. W. 781, such law was held unconstitutional, as unduly invading the liberty of the employer to make or refuse to make contracts with whom he pleased. In that case the act committed was merely discharging an employé, and it was contended that it was prohibited by the law. The court said: 'If an owner,' etc., 'obeys the law on which this prosecution rests, he is thereby deprived of a right and a liberty to contract or terminate a contract as all others may. . . . We deny the power of the legislature to do this; to brand as an offense that which the constitution designates and declares to be right, and therefore an innocent act.' And further: 'Nor can the statute escape censure by assuming the label of a police regulation. It has none of the elements or attributes which pertain to such a regulation, for it does not, in terms or by implication, promote, or tend to promote, the public health, welfare, comfort, or safety; and, if it did, the State would not be allowed, under the guise and pretense of police regulation, to encroach or trample upon any of the just rights of the citizens, which the constitution intended to secure against diminution or abridgement.' In Gillespie *vs.* People, 188 Ill. 176, 58 N. E. 1007 [see "*Bulletin of the Department of Labor,*" No. 35, page 797], was considered a similar act, claimed to be breached by discharging an employé because he was a member of a certain labor organization. That court also held the act unconstitutional, adopting substantially the views of the Missouri court in the preceding case.

In considering our own statute under which relator is committed, it must first be noted that we are concerned only with that portion added to preëxisting statutes (section 4466b. Rev. St. 1898) by the act of 1899, 'No person or corporation shall discharge an employé because he is a member of any labor organization,' for the relator is not charged with breach of any other of the provisions of that act. Confining ourselves, then, to the act so changed, and the statutory prohibition involved, is it within the legislative power to make criminal the refusal to contract with another for his labor for any reason which the employer deems cogent? We speak of refusal to contract, for, while the act mentions only discharge, it is in no wise limited to situations where there is any contract or other right to continuance of employment, and is obviously intended by the framers to apply generally to the relation of employer and employé, where, as common knowledge assures us, there is usually no term of employment, and each day constitutes a new contract. As each morning comes, the employé is free to decide not to work, the employer to decide not to receive him, but for this statute. That the act in question invades the liberty of the employer in an extreme degree and in a respect entitled to be held sacred, except for the most cogent and urgent countervailing considerations, we have pointed out. Hardly any of the personal civil rights is higher than that of free will in forming and continuing the relation of master and servant. If that may be denied by law, the result is legalized thralldom, not liberty, certainly not to the laboring men of the country. This aspect of the subject is too clear to warrant further discussion. Is there any conceivable reason to warrant such extreme invasion of individual liberty? Can it be necessary to the reasonable liberty of others under the law? The act here charged as criminal clearly does not deprive any other person of any private or civil right. Its utmost effect is to deny privilege of contract, but no right exists to enter into contract with another against his will. As the legislation clearly and beyond doubt invades the natural liberty of the individual, it must be void, unless we can discover both the existence of a public need, and at least tendency of the statute to provide therefore. In the search for such need and purpose we must and do concede to the legislative branch of the Government the fullest exercise of discretion within the realm of reason, and, if a public purpose can be conceived which might rationally be deemed to justify the act, the court cannot further weigh the adequacy of the need or the wisdom of the method. When, however, after all diligence and reflection, we are unable to discover any such public need or purpose, we have no alternative conclusion, save that the legislature has, 'under the guise of protecting public interests, arbitrarily interfered with private business, and imposed unusual and unnecessary restrictions upon lawful occupations,' which it may not do.

"We agree with the trial court that the enactment under consideration exceeded the limitations imposed by the constitution of Wisconsin upon the legislature. It is therefore void, and conferred no power upon the magistrate to make the commitment under which petitioner was held in custody."

BOOKS & PAPERS

THE survey of London was begun by Sir Walter Besant some years ago, but his death stopped the work. It was, as he said, a "big chapter" to write, and only a part was finished; which part will shortly be published. Meanwhile his publishers have issued four little volumes, christened after a favorite word of the author's relating to the work. "It was fascinating," he said; it "fascinated" him — hence the general title of the series is called "The Fascination of London."[1] It is fascinating, whether we take up the "*Chelsea,*" the "*Westminster,*" the "*Strand,*" or the "*Hampstead*" volume.

Chelsea, for instance, with its Bun House, now no more. Imagine the smart world walking under the Colonnade in the morning eating buns! It was the thing to do, so it mattered not what the thing was. On Good Friday 50,000 people would congregate there, and the consumption of buns reached 240,000! This was in the time of the Georges. The second George went to the Bun House with Queen Caroline and the Princesses, and the third George with Queen Charlotte. Swift, too, writes in 1712 to Stella: "Pray, are not fine buns sold in our town as the rare Chelsea buns?"

In the old church stands the monument to Sir Thomas More, prepared by himself before his death. It is memorable as showing the use of the word "heretick" in those days, More coupling it with "thieves and murderers"; but Erasmus struck it out of the epitaph. It is told of the great Chancellor, that one Sunday he entered the chapel and, bowing to his wife, said "Madam, the Chancellor has gone." Whether Sir Thomas was buried at Chelsea is disputed; but it is generally held that Margaret Roper, his daughter, removed his body to Chelsea after his execution.

Addison lived in Sandford Manor-house, just across the bridge, and in a letter written to the little Lord Warwick, his stepson, he describes the beauty of the singing-birds thereabouts: "The business of this is to invite you to a concert of music, which I have found in a neighbouring wood. It begins precisely at six in the evening, and consists of a blackbird, a thrush, a robin redbreast and a bullfinch. There is a lark, by way of overture, sings and mounts until she is out of hearing, and the whole is concluded by a nightingale."

The hospital is well described in all its parts. It is a fine building and interesting from many points-of-view. Many are its relics, and

[1] "*The Fascination of London.*" By Sir Walter Besant and G. E. Milton. London: A. & C. Black. 1s. 6d. per volume.

flags taken from the enemy, and not the least interesting of its monuments is that to the memory of the soldiers on board the "*Birkenhead*," who stood as on parade, while the women and children were saved, going down with the ship without a murmur — surely a finer example of courage than any battle has ever given us.

Westminster is an old-world place in spite of modern improvements. Every street records the past in its name: Orchard Street, Pear Street, Vine Street — these in the Abbey precincts tell of the monastery's gardens. But there are many old nooks to be visited, besides the great abbey church, almshouses and schools with quaint gateways and effigies of Bluecoat or Greycoat boys over the pediments. Emanuel Hospital has gone; and so has the Greencoat School, and many a street, and gate, and wall. But the Abbey is a host in itself.

Perhaps the most interesting of the books is the "*Strand*." In this neighborhood artists congregated in former times. Turner, Reynolds, Cosway, Gainsborough, Kneller, Lely and a host of others lived within a half mile of Covent Garden; and authors and poets not a few. Johnson, Dryden, Pope, Sir Isaac Newton, Coleridge and many another celebrity. The centre of London, now commercial, it was in the eighteenth and early part of the nineteenth century the quarter where wits and gallants lived. Between the Strand and the Thames were all the big houses of peers and bishops a century earlier — you can trace them by the street-names. Another celebrity, the wonderful boy Mozart, aged eight, performed at a concert in Frith Street, then Thrift Street. He could play at sight or make a bass to any music, "which he will write upon the spot without recurring to his harpsichord."

This district contains the long stretch of streets which Nash constructed from Regent's Park to St. James's Park — Portland Place, Regent Street and Circus, Waterloo Place and Carlton Terrace — almost the only complete architectural design in London. St. James Piccadilly is a notable church by Sir C. Wren, St. Martin's is by Gibbs, St. Clement Danes by Wren. Hungerford Market has disappeared, but we remember that Franklin lived there, just where the Charing Cross Station yard is now situated. Buckingham, afterwards York, House has gone with its friends, but the water-gate remains, a relic, possibly, of Inigo Jones's work: it is on the Embankment, lost in a hole; but a little common sense and artistic feeling might make a fine monument of it, by digging out the ground all round, and constructing an ornamental pond into which the steps of the old gate should descend. Were the pond or ornamental water large enough, some pleasure-boats might be added — certainly aquatic birds would give it life. As it is, the gate is senseless and impossible to be seen from a proper distance.

Just off the Strand is a Roman bath, 18′ x 42′. Inigo Jones lived in St. Martin's Lane and there the Royal Academy began its career.

Nor is Hampstead far behind the Strand in interest. In 1735 it is described by Seymour as "one of the Politest Public Places in England" — equal to Bath, Tunbridge and Scarborough, as it, too, had its pump-rooms. Many are its literary memories — Reynolds, Garrick, Sterne, Hogarth and, later on, Coleridge found peace in its country lanes. Fanny Burney (Madame d'Arblay) lived there and made her "Evelina" dance in the rooms of Well Walk.

This volume takes us perambulating round the Regent's Park and what is now St. John's Wood, the home of many artists; and then away we go to Highgate Ponds, and round by the "Spaniards" on the heath, to the Finchley Road artists' haunts.

The series is a compressed guide-book from the artistic and literary point-of-view. It is not dry, but is written in Walter Besant's easy flowing style — that of a man who writes upon what he has at his fingers' ends, as we say. Nor is architecture left out; indeed, the books are excellent up to a certain point — not a too superficial point, but a point from which one can start upon a more serious journey, and which paves the way to more exhaustive works. It shows, absolutely, the "fascination" of London, and would be an excellent companion to the hurried voyager as he perambulates the big city.

A few mistakes of dates do appear; and we may, I hope, be allowed to grumble at the foolishness of rough, irregular edges. The nineteenth century having invented a charming instrument for cutting leaves of books evenly, and thereby saving the reader's time, and defeating the dirt and dust enemies, the twentieth century is going back to the eighteenth, finding the dirty, rough edges more "quaint" and "artistic." Alas, when will art cease to be the high-priest of follies?

THE publishers of the London *Builders' Journal and Architectural Record*, and of *The Architectural Review*, have annually collected a mass of information which was originally scattered through the pages of their several journals and is made of usable permanent value by being collected, indexed and systematically arranged in a single book. The book so prepared[1] can easily be of great value to an English practitioner. There is also a considerable amount of material which is of limited value to the American architect. The idea of putting such material into tangible shape is a most excellent one. The really valuable information in our architectural journals is very often lost, and no system of scrap-books or indexing will be quite as useful as the collection of all the material in a single carefully arranged volume.

[1] "*Specification for Architects, Surveyors and Engineers when Specifying; and for All Interested in Building*": Division I, Professional Practice. Division II, Working Drawings. Division III, Construction. Division IV, Municipal Engineer. No. 6 (1903). Published by the proprietors of *The Builders' Journal and Architectural Record* (weekly); *The Architectural Review* (monthly), 9 East Harding Street, London.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

LOWELL DISTRICT GRAMMAR SCHOOL, HEATH ST., ROXBURY, MASS. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

HOUSE AND ENTRANCE HALL OF E. W. SMITH, ESQ., KANSAS CITY, MO. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, KANSAS CITY, MO.

ARCH OF ALFONSO OF ARAGON, NAPLES, ITALY.

FOR description see article elsewhere in this issue.

DETAILS OF THE SAME.

Additional Illustrations in the International Edition.

LIBRARY IN THE HOUSE OF E. W. SMITH, ESQ., KANSAS CITY, MO. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, KANSAS CITY, MO.

DINING-ROOM IN THE SAME HOUSE.

ENTRANCE TO THE KLOSTERHOF, NEUZELLE; — EAST ENTRANCE TO THE AUDIENCIA, SARAGOSSA, SPAIN.

DIOGENES IN THE SQUARE DU TEMPLE, PARIS, FRANCE. MARIOTTON, SCULPTOR; — A MODERN ANTIQUE.

OLD GATEWAY, DORDRECHT, HOLLAND.

GREENWICH HOSPITAL, GREENWICH, ENGLAND.

NOTES & CLIPPINGS

MEXICAN PREHISTORIC RUINS. — A dispatch to the *Tribune* from Mexico City says that the recent discovery of an ancient city of pyramids in a dense forest in a remote part of the State of Puebla has been found to be of the greatest archæological importance. The Federal Government has commissioned the sub-director of the National Museum, Señor F. Rodriguez, to visit the ruins. Nicholas Leon, an archæologist and ethnologist, accompanied the sub-director to the ruins. Dr. Leon reports that the ruins are such as never before have been known to archæologists, and are so ancient as to require a great deal of time and study to determine in what epoch they were built as well as by what people.

THE PALAIS BOURBON, PARIS. — The Palais Bourbon in Paris is generally considered by visitors from other capitals to be remarkably small for a legislative palace. This arises, no doubt, from the façade suggesting no more than a single story. The history of the building is curious. The site belonged to the abbey of Saint-Germain des Prés, and it was acquired in order to erect barracks for the musketeers; but as there was not enough money the project was abandoned. A Dowager-Duchess of Bourbon obtained the ground and erected a mansion on it from the designs of an Italian architect, Girardini. Her grandson, when he obtained the property, enlarged the palace by the amalgamation of other buildings. At the time of the Revolution it was arranged for the meetings of the Council of Five Hundred. Then under Napoleon the familiar peristyle was constructed by Poyet. Amidst so many changes it would be strange if there was much unity in the buildings. The *salle* where the Legislature meets was constructed in 1832. Of late years the accommodation has proved to be insufficient, and various projects for a transformation have been prepared. A plan by M. Buquet, the architect in charge of the palace, has received approval and a model has been prepared of the proposed hall for the Assembly. Provision will be made for 622 members, and around the amphitheatre there will be twenty-one doors. Two galleries will be introduced, arranged in tribunes. It is proposed to occupy the wall behind the chair for the President and the tribune from which the members speak with three large paintings for which it is expected the commissions will be offered to M. Bonnat, M. Jean-Paul Laurens and M. Cormon. Prior to 1848, when the Government of Louis-Philippe was overthrown, the hall was found to be too small to contain the members who considered it to be their duty to take part in the historic events. It was necessary to set up a supplementary structure of wood and painted canvas. By M. Buquet's arrangements a course of that kind will be unnecessary unless the number of representatives is increased. — *The Architect.*

New Pine Forests in California. — For three months, beginning last November, a squad of from ten to fifteen men, under a competent leader, spent its time reseeding the mountain regions of Southern California, where fires had denuded the surface. The country, alarmed by the decreasing water-supply, asked for this work, and assistance was given by the towns of the section visited in carrying on the replanting. Pine, in varieties suited to the moisture likely to be secured, was generally planted. On March 1, this year, it was announced that the seeds planted in November had begun to germinate, and that there was promise of a successful growth over the areas treated. In a few years the bare mountain sides will be clothed again with green. — *Review of Reviews.*

The Washington University Travelling Scholarship. — Francis S. Swales is announced as the winner of the Washington University Travelling Scholarship, Albert D. Millar receiving Honorable Mention. The competition consisted of three rendered and three sketch problems. The drawings of Mr. Swales were placed first for their uniform excellence and the virility of design and clever draughtsmanship for which his work has been favorably known heretofore. Mr. Swales's natural gifts together with considerable office training under various good men should form an excellent foundation for the term of serious study abroad made possible by his present success. For a special study Mr. Swales has chosen the great theatres of Europe, a subject which he has already become interested in by reason of his employment on a number of the important theatres recently erected. — *Exchange.*

Forestry made easy for Farmers. — A unique way of dealing with forest problems is to illustrate and solve them by means of diagrams, as has been done by Henry S. Graves and R. T. Fisher in a bulletin entitled "The Woodlot," issued by the Bureau of Forestry of the Department of Agriculture. The bulletin is intended for the guidance of farmers and other owners of small timber holdings in southern New England who desire to improve the condition of their timber. In the series of thirty outline drawings every problem in improving woodlots that occurs in southern New England is included. The bulletin gives such specific information that the farmer will know how to go about the task of handling his own forest problem — and that is just the sort of information the farmer has been asking for. The bulletin contains also suggestions for pruning, protection of the woods from fire, grazing, insects and wind, and a general discussion of the character of woodlands of southern New England, and of the practicability of forestry. — *N. Y. Evening Post.*

Forest Fires. — Investigation by the Bureau of Forestry has shown that, in an average year, sixty human lives are lost in forest fires; $25,000,000 worth of real property is destroyed; 10,274,089 acres of timber-land are burned over; and young forest growth, worth, at the lowest estimate, $75,000,000, is killed. The forest fires in the Adirondacks have once more called public attention to the imperative need of precautions. The experience even of those States which have the best forest-fire legislation has shown that legislation alone cannot solve the problem. Pennsylvania, which probably leads in this respect, spends annually $15,000 in checking forest fires, giving the State constables extra pay for their services as fire-wardens in their respective townships. New York has also done something in this direction, especially with regard to the State reserves and parks, but much remains to be done. A great portion of the fires owe their origin to sheer carelessness. Watchfulness is the duty, not merely of the paid official, but also of every private citizen. The origin of the great fires which have been raging in the East is traceable to sparks from locomotives, carelessly managed camp-fires, and, in numerous instances, to incendiaries. The rainless period has made a serious conflagration possible in any unguarded forest where there is much underbrush. — *Fire and Water Engineering.*

The Larch-tree in Scotland. — It is just 165 years ago since the second Duke of Athole, a passionate lover of trees, received from Mr. Menzies, of Culdares, a few young trees from the Tyrol of a species hitherto unknown in Great Britian. It was deemed doubtful whether natives of a region so southerly as the Tyrol would endure the rigors of a Highland winter, so the seedlings were committed to the care of the gardener at Dunkeld House, who bestowed them tenderly in a greenhouse. Moist warmth and close atmosphere were conditions least favorable to the little mountaineers; spindling sadly, most of them died, and the whole were cast out on the waste-heap. Two of them retained enough vitality to revive in the clear, sharp air; they struck their rootlets into the sandy soil, and the Duke probably had forgotten all about Mr. Menzies's gift, when, one April morning, his eye fell upon a couple of dainty saplings, feathered with tender green, and studded with crimson bosses. Such was the haphazard introduction of the larch into Great Britain. The pair of outcasts may still be viewed near the west end of Dunkeld Cathedral, mighty columns clothed with deeply sculptured bark, towering to the height of 100 feet, with far-spreading limbs casting dappled shade upon the greensward. The incident above described marked a notable era in British forestry. The Duke was so well pleased with the grace and vigor of the foreigners that, before his death in 1764, he had planted twenty square miles of his land with larches. For better or for worse, an element had been imported into Highland landscape which, more than any other, has wrought a change upon the aspect of our hillsides and glens. There are but three coniferous trees indigenous to Britain, the Scots pine, the yew and the lowly juniper, all of them evergreen. The larch invasion cannot be reckoned an enrichment of the native woodland, because, lovely as this tree is in spring, when it puts forth its exquisite foliage of malachite green, in winter a larch wood is cold and bare, and the eye draws little solace from the expanse of ashen yellow which has been made to replace the rich velvet mantle of Scots pine, relieved by gleaming, ruddy boughs.

> As I did stand my watch upon the hill,
> I look'd toward Birnam, and anon, methought
> The wood began to move.

Birnam Wood has long since been felled, and has either come up again in the form of stool-grown oaks, never so free as the original trees from seed, or has been replanted with spruce and larch. But still there stands between Birnam Hotel and the river a giant oak, reputed to be the last survivor of Macbeth's "moving grove." It girths 22 feet at 4 feet from the ground, giving a diameter of 7 feet 4 inches. Hard by stands a formidable rival to the native, in the shape of a huge sycamore, which is not a tree indigenous to Britain. This monster has swelled to a girth of 24 feet at 4 feet from the ground, while, measured round the exposed part of the trunk at the ground level, it gives a dimension of upward of 50 feet. Birnam Hill itself is still clothed in part with forest, but the trees are nearly all exotic — larch and spruce — save where the birch has sprung up thickly in the glades rent by storms. This pass of Birnam, of old the main portal to the Highlands of Breadalbane and Blair Athol, is the choicest ground in all Scotland for the lover of trees. For many centuries the forest wealth of North Britain received ruthless, spendthrift handling. Generation after generation cut and came again for their hand-to-mouth wants, without a thought, apparently, for those who should come after them; until, at the beginning of the eighteenth century, Scotland had assumed that dispiriting nakedness which was to justify Dr. Johnson in his gibe that in all his Scottish travels he never saw but three trees big enough to hang a man upon. Dunkeld and Birnam got a good start in reafforestation through the rare prescience of the aforesaid Duke of Athole. Much of the ground about Dunkeld is so steep as to be quite inaccessible for ordinary planting operations; so that one wonders how exotic trees like larch, spruce and silver fir obtained their foothold on these cliffs which they do so greatly adorn. The tradition runs that Napier the engineer, being on a visit to the planting Duke, and sympathizing with his host's desire to restore the woodland, caused tin canisters to be filled with tree-seeds and fired out of cannon against the heights. The canisters, bursting against the rocks, scattered the seeds bravely, so that now every ledge, every cranny on Craig-y-Barns and Craig Vinean, bears noble timber. — *Pall Mall Gazette.*

Direct and Indirect Underpinning. — Not less than four distinct modes of underpinning are exemplified in a description recently given by the *Engineering Record.* The foundations of a wall, 75 feet long, forming one side of a six-story building, had to be removed and carried down several feet to the sandy bottom of a new excavation, rendered necessary by the erection of an adjoining building. The wall was temporarily carried by needle-beams, resting at one end on sills laid on the cellar floor, and supported at the other by a series of posts, inserted after the wall had been lifted bodily by screw-jacks. Brick piers were next built up between the needles from new footings to take the weight of the old wall, and after removal of the needles the remaining brickwork was added, the whole being wedged up and thoroughly grouted. The corner of the front wall was supported entirely from the inside by a horizontal timber cantilever, of which one end was inserted and wedged into a recess cut in the brickwork, and the other end reacted against a post wedged across the underside of several joists in the basement floor, while the fulcrum was furnished by a set of the needle-beams already mentioned. At the opposite end of the building the corner was similarly supported. Another ingenious piece of work in the same building was the support of a heavily-loaded stone pier, 4 feet square, by means of two cantilevers, the short arms of which were secured to the pier by steel pins, and the reaction of the long arms was taken by posts wedged up against distributing beams across the underside of the floor above. In this manner the pier was safely supported so as to permit the removal of the footing and the building of a new foundation. At one part of the side wall a stone pier, 2 feet square, had to be underpinned with the wall. It was difficult to secure bearings for temporary supports, and unsafe to cut away material for the insertion of a needle-beam. Therefore, a pair of steel pins were inserted horizontally to take bearing upon one of the main needles, and the other side was supported by the aid of a cantilever placed below the foot of the pier in a notch cut into the foundation, the long arm of the cantilever reacting through a post wedged against the basement floor-beams. By these simple devices one side of the building was rendered independent of the old foundations, and it naturally follows that if any subsidence had been feared it would have been perfectly easy to guard against injury by jacks acting between the posts and the various supporting beams. — *The Builder.*

Connecticut Forest Preservation. — The experimental legislation which was enacted two years ago with reference to forestry has been broadened by a bill which Governor Chamberlain has just signed, and which has attracted much interest among the advocates of forest preservation. The maximum of $2.50 per acre which the State forester was originally authorized to pay for barren woodland for a State forest has been enlarged to $4. The original amount was not large enough to secure satisfactory land. The State forester is authorized to sell wood and timber from the State forest at his discretion and to apply the proceeds to the maintenance and care of the forest. A State forest has already been established in Middlesex County. The purpose of the forestry legislation is to supply object-lessons in the scientific manipulation of woodlands and to determine by experiment the kind of trees best adapted to the various soils of the State. — *Exchange.*

S. J. Parkhill & Co., Printers, Boston, U. S. A.

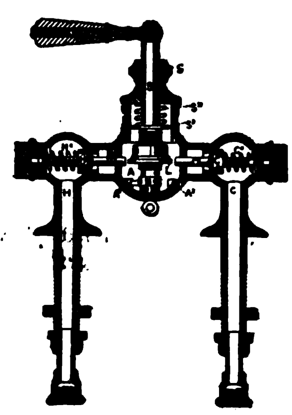
THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT

No. 254 SATURDAY, JULY 4, 1903 VOLUME LXXXI No. 1436

THE SODERLUND TWIN FAUCET.

The Soderlund Twin Faucet is designed for use where hot and cold water is used and a thorough mixture of the two at a temperature of any degree between the two extremes is required. The two valves, one for the hot and one for the cold, are entirely free and work with the pressure horizontally, and are so arranged that it is impossible for them to rattle. The handle is attached to a cam, which, as it is turned, comes in contact with one of the valve-stems, opening it gradually against the pressure. When the first valve is open to its fullest extent, the cam will, by turning the handle a little farther, come in contact with the stem No. 2, and a mixture of the two waters is obtained, and as one keeps turning the handle the chamber receives a larger flow from valve No. 2 and less from valve No. 1 until the same comes to its seat and No. 2 is wide open; then as one continues to turn handle to a stop, gradually allowing valve-stem No. 2 to come to its seat with the pressure, both are closed.



"Soderlund Twin Faucet."

In operating this faucet, a half turn only is made with the handle by simply turning it from one side to the other.

These fixtures are made in different styles and sizes for lavatories, bath-tubs and shower-baths. The simplicity of their construction, the readiness with which any temperature of water may be obtained by the one handle; the ease with which the washers may be replaced (by simply taking off the end nuts) and the combining of durability with attractiveness have placed the Soderlund Fixtures at the head in the line of combination faucets.

The Soderlund Non-scalding Shower-valve is without question the safest and best device of its kind upon the market, the danger of scalding being wholly eliminated by its use. This fixture is so made that the supplies may enter the top, bottom or back as may be required, for ceiling, floor or wall connections.

These fixtures are now in use in many of the leading gymnasiums, colleges, hospitals, asylums, and public and private institutions throughout the country.

The entire line of Soderlund Fixtures is protected by United States and Foreign Patents; is manufactured only by the Union Brass Works Co., 7 Sherman Street, Charlestown, Mass., and for sale by the leading jobbers of plumbers' supplies.

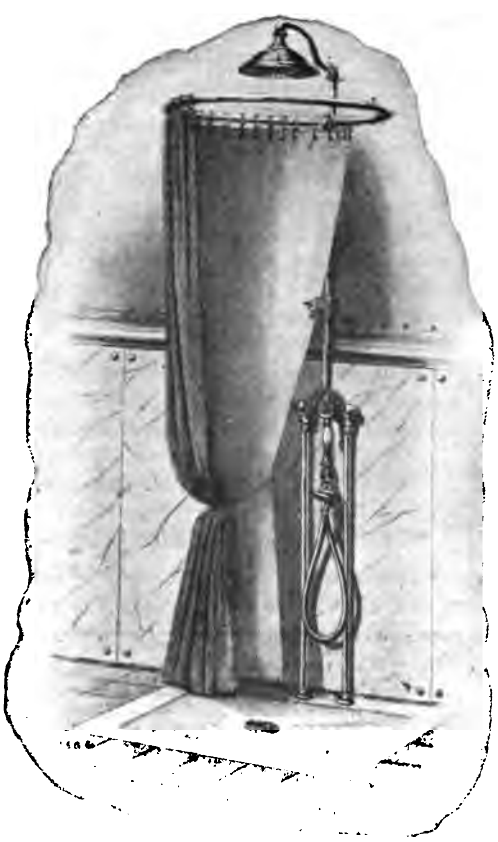
Illustrated catalogue of these goods may be had upon request to the manufacturers.

THE QUESTION OF JOINTS.

Nowadays the question of an absolute and positively air-tight joint is of great importance.

Wisconsin Graphite Pipe-joint Paste solves the problem and is the only solution.

It is infinitely cheaper than red or white lead and vastly superior. It saves money, time and trouble. It forms a perfect joint, successfully resisting heat, cold, acids and alkalies. It lasts indefinitely, but is plastic and the joint can be disconnected at any time without injury to thread or pipe. For all purposes Wisconsin Graphite Pipe-joint Paste is without an equal.



The Soderlund Non-scalding Shower-valve.

When ordering valves, pipe-fittings, or supplies of any kind, don't fail to include an order for Wisconsin Graphite Pipe-joint Paste.

WISCONSIN GRAPHITE CO.,
PITTSBURGH, PA.

HEATING AND VENTILATING TELEPHONE EXCHANGES.

The New England Telephone & Telegraph Co., of Boston, Mass., possesses one of the most completely equipped exchanges in the country. Not only are the electrical and telephone appliances the products of the best engineering skill and attention, but the building itself has been especially designed with a view to both successful operation and the comfort and convenience of the employés.

One of the first requisites of the telephone exchange building, because of the large number of employés and their constant and sedentary labor, is a proper system of heating and ventilating. The ventilation is especially important, and arrangements should be provided by which it can be maintained constant in volume independently of the amount of heat required or the state of the weather. Any natural means of ventilation is impracticable, since it is very difficult to maintain a proper circulation of air when the densities of the inside and outside air are nearly equal. With the fan-system, however, all these points are easily taken care of.

In the present plant, the fan, which is direct-connected to a vertical engine, forces the air through a steam-heater composed of pipe-coils, enclosed within a steel-plate housing. The heater, however, is by-passed, so that a greater or less proportion of the air may be forced into the distributing-pipes without passing through it, and this by-pass is fitted with a special hot-and-cold damper arrangement which is automatically controlled by Johnson thermostats located in the several rooms of the building. The B. F. Sturtevant Co., by whom the fan and heater were installed, also supplied the galvanized-iron piping, elbows, fittings, registers and screens, together with the direct steam-heating work, automatic control and the boiler and boiler setting. The steam is delivered to the engine at twenty-five pounds pressure, and the exhaust passes into the heater.

A somewhat similar equipment was furnished by the above Company to the Twin

City Telephone Co., of St. Paul, Minn., some time ago. In this case special precaution was taken to purify the air-supply. It has been demonstrated that about ninety per cent of the trouble caused by imperfect contact in the switch-board connections can be prevented by thoroughly cleansing the air as it enters the building. Many experiments have been tried in the way of dry-cleaning by filtering through screens of wire and cheese-cloth or cotton-batting, but all such devices require frequent renewal, sometimes at considerable trouble and expense. By continued use any filter of this character must deteriorate and eventually become clogged, and in order to avoid the results of neglect it ought to be practically automatic. This point is essential in an air-cleaning system.

The action of the air purifying and cooling apparatus adopted by the Twin City Telephone Co. consists in thoroughly saturating the air with water by passing it through a fine spray and afterwards precipitating the moisture with the collected impurities and discharging it into the sewer. The water, which is taken up at high velocity and held in mechanical suspension, is extracted by centrifugal force by passing it through a series of tubes in which spirals are so placed as to give the air a whirling motion, causing the suspended particles, which are heavier than the air, to be thrown outward and brought in contact with the tubes, from which they flow through perforations to a drip-pan below.

The washing process imparts about seventy per cent humidity at a temperature of 70 degrees Fahr. in the operating-room. This is considered the most desirable for health and comfort and avoids the excessive dryness resulting with other systems of heating and ventilating which often require a humidostat to correct the defect. Moreover, in the summer time, with the outside temperature at 80 degrees Fahr. and with the normal temperature of the city water, the air delivered to the rooms can be readily reduced to 70 degrees.

The air after being tempered, washed and dried is blown by the fan through the reheating coils into the tempered air-chamber. A mixing damper is placed with connections to both, so arranged that the hot or tempered air, under the control of the Powers thermostat in the operating-room, is mixed automatically to the proper degree, maintaining throughout the year a constant temperature in the room with uniform air delivery and humidity.

While such a system is practically a necessity in a modern telephone building, especially in cities where soft coal is burned, it is equally applicable to all public buildings, particularly in large cities where the air is laden with impurities and where the summer heat is almost unbearable. The time is probably not far distant when the marked advantages of such a system will be fully recognized and people will insist that they should be kept cool in summer as well as warm in winter.

The United Engineering & Foundry Co., of Pittsburgh, installed last year a complete heating and ventilating equipment in the roll-shop of the Lincoln Foundry Department. The apparatus, which was furnished by the B. F. Sturtevant Co., consists of a steel-plate exhauster direct-connected to a horizontal, side-crank engine. The exhauster draws air from out of doors through a large steam-heater built up in sections of 1-inch pipe, one of the sections receiving the exhaust from the fan-engine.

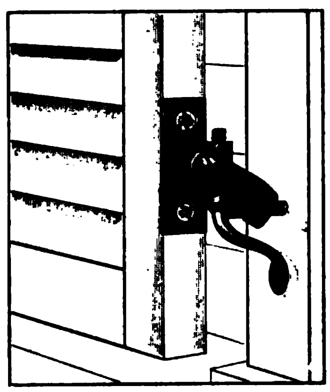
THE JORUTH BLIND FASTENER

Is a simple device for securing a blind when open without the use of a spike catch or spindle driven into or otherwise attached to the side of the house. It is attached to the lower hinge of the blind, as shown in the cut below, by removing the middle screw and using the long screw which is furnished with the fastener.

Its use avoids the cracking of the clapboard and it can be operated without the danger and inconvenience of leaning out of the window.

Owners of brick houses are saved much expense by their use and owners of old wooden houses upon which the old-fashioned spike catches have worked loose through the rotting of the wood, due to the creeping in of moisture, find in this invention help out of a difficulty which no other device offers.

It holds the blind firmly against the side of



The Joruth Blind Fastener.

the house, preventing the wind from getting behind it or raising it from the brackets.

Any one who can turn a screw-driver can apply it in a few moments.

The following testimonial from one of Boston's best known architects is worth considering: —

BOSTON, MASS., June 1, 1903.

THE JORUTH MANFG. Co.,
Wollaston, Mass.: —

Dear Sirs, — Unsolicited, I desire to express my appreciation of the many desirable qualities possessed by your blind fastening.

Some of its good qualities consist in its cheapness of cost, its durability and ease of application to new and old blinds. It can be applied by any person who knows what a screw-driver is when they see one.

But its great merit lies in the very efficient manner in which it holds a blind securely, and prevents that common fault of slamming.

Respectfully yours,
HENRY J. PRESTON.

RUFUS, THE ROOFER, SAYS —

"THERE is one thing you ought to know by now, and that is that you've got to treat even good tin respectful like. I've seen some metal-workers use a good heavy-coated terne plate in a way that would make a macadamized road shrink up.

"When your tin roof is down keep off it as much as possible. A tin roof is not a driveway for speeding steam-shovels on. Neither is it a place to try hobnailed boots.

"Don't let the masons dump brick and mortar on it, or the carpenters throw planks with nails in them upon it. That is, not if you want a good tin roof.

"You've got to use a roof as well as a tin roof should be used if you want a good roof, no matter what tin you put upon it. The man that expects a tin roof to take anything that comes in the way of rough usage while the roof is going on would use a grand piano to keep his potatoes in and then wonder why it didn't sound well.

"The better the tin the better care you should give it putting it on.

"A good roofing-paper should go under every tin. Use the best solder you can get, and paint the tin as soon as it is laid. It doesn't do any tin good to paint the rust that has settled on it over night.

"You want to do all of these things, but you want to be sure first that your tin is 'Taylor Old Style.'

"There are architects and builders who have an idea that there are a good many 'Taylor Old Styles,' or at least a good many tins like it. They do not come right out square and say 'Taylor Old Style.' They say, '"Taylor Old Style" or equal,' or 'an extra heavy roofing terne,' or 'old-style, hand-dipped tin.' They beat about the bush and in the end they do not get 'Taylor Old Style,' and they do not get anything just as good. It is always best to have the name with you. You cannot get away from the name."

In the June *Arrow*. Published by

N. & G. TAYLOR CO.
(Manufacturers of Tin Plate),
PHILADELPHIA, PA.

IN JAPAN.

THE Bridgeport Wood-finishing Co., of New Milford, Conn., New York, Philadelphia and Chicago, is exhibiting its Wheeler Patent Wood Filler, stains and other specialties at the Osaka Exposition, Osaka, Japan, and has just received word from its representative there that the Emperor of Japan was his guest at the exhibit on the day of the opening ceremonies.

PUMP-VALVES.

CONSIDERABLE care should be used in the selection of pump-valves in order that the proper valve for a certain kind of work may be procured. A leak in a flanged or other exposed joint is easily seen and soon remedied, but pump-valves are enclosed, and leaks occurring from their defects are not visible and often go for a long time unnoticed, causing considerable loss of power. Leaks caused by defective pump-valves are frequently due to the fact that but one class of valve is manufactured and sold for use in all kinds of service. Our experience has proved that no one class of valve can be made that is suitable for all the various kinds and conditions of service in which pumps are used.

Jenkins Brothers' Pump-valves are made from various compounds, each of which is best adapted for a particular kind of work. Our many years of experience have enabled us to so perfect these compounds and the process of manufacture that we can confidently recommend our pump-valves as the very best obtainable.

They are guaranteed, and unless used in service for which they are not intended we will always replace such as fail to give satisfactory or reasonable service.

We make grades suitable for cold, warm or hot water, either high or low pressure, also for naphtha, mild acids, ammonia, or for very muddy and gritty water and other destructive fluids, which will give entire satisfaction where other makes of valves have failed. For mining or high-pressure service, or for elevator service, where the water is often slightly oily, Jenkins Brothers' No. 88 Pump-valves prove

equal to every requirement. Our soft-rubber valves for condenser air-pumps are unequal for such work.

For air-compressors our No. 80 Pump-valves have been very successful. While extremely hard, they possess sufficient elasticity to ensure absolute tightness under various conditions of pressure.

We use only the very best grades of Para rubber in the manufacture of our pump-valves and other specialties, and no substitutes for rubber are ever employed.

When ordering, to secure the best results, state the kind of service the valves are to be used in, the kind of fluid handled, pressure or head pump is working against, etc., also give diameter, thickness and size of hole.

JENKINS BROS.,
New York, N. Y.

A REFRESHING SHOWER AND ITS ADVANTAGES.

The shower or rain bath has long been recognized as one of the most pleasant and exhilarating adjuncts of the bath-room, and many eminent physicians and sanitarians pronounce its use most beneficial, claiming that it has an invigorating effect on the system unknown to the tub bath alone; that the effect of falling water given by the shower stimulates the surface circulation and produces a healthy glow that is not only refreshing, but counteracts the enervating effect produced by the tub bath; this is a feature highly appreciated by women. It affords a splendid means for rinsing the body and closing the pores of the skin, gives the bather a delicious sense of cleanliness and renewed vitality.

Thousands of purchasers of "Standard" Portable Showers have become shower-bath enthusiasts, many of whom, living in rented houses, or apartments, have heretofore refrained from installing expensive permanent fixtures. This shower will last a lifetime; is high grade in every respect and gives as good results as the more expensive permanent fixtures.

The curtain is of best soft, white rubber, or white duck, and folds back in small space when not in use.

The frame is made of seamless brass tubing, nickel-plated, substantially made and well braced.

No difficulty will be experienced in placing them in position, a couple of nails or screws driven into the wall over the tub at the height desired being all that is necessary.

The rubber supply-tube is made with patented "holdfast," allowing the shower to be readily attached to any regular bath-tub faucet.

Write for illustrated booklet, entitled "*For Beauty's Sake.*"

Price complete, with rubber or white duck curtain, $15.

STANDARD SANITARY MFG. CO.,
Pittsburgh, Pa.

ROUND-HOUSE HEATING AND VENTILATION.

The twenty-stall round-house of the Norfolk & Western Railway, at Portsmouth, Ohio, has been equipped with the "hot blast" system of heating, the apparatus consisting of a large exhaust-fan direct-connected to a horizontal engine and drawing air through a steam-coil heater built up of 1-inch steam-piping on cast-iron sections. From this apparatus air is distributed throughout the round-house by brick flues and galvanized-iron piping, so arranged that heated air may be delivered into each engine-pit. It will thus serve to melt off snow or ice from incoming locomotives when that is required. From the pits the heated air rises vertically, so that there is no trouble from smoke or steam in the inhabited zone of the building. On account of the dry character of the air supplied by the system, all moisture due to the melting of snow or ice is quickly evaporated, making it possible to work on air-engines without discomfort within a very short time after it enters the building. During warm weather it is possible to operate the fan without steam in the heater and in that manner provide a very thorough ventilation of the building, which is rarely accomplished in round-houses equipped with the ordinary direct system of steam or hot-water heating. Other advantages, as compared with the direct system, are that there is no piping scattered about the building to freeze or burst in cold weather, there are no joints to leak, and there is no danger of fire from the proximity of steam-pipes to inflammable materials. Since the piping is all concentrated in a steel-plated housing, where the velocity of the air passing over it is very high, much less length of pipe is needed than would otherwise be necessary. The above described equipment has been designed and installed by the

B. F. STURTEVANT CO.,
Boston, Mass.

BLUE-PRINTING.

We have already taken the initiative in making two radical changes in the blue-print business in Boston, viz: —

(1) Publicly announcing a price of two and one-half cents per square foot for blue-prints, and (2) advertising to make electric-light prints at the same price.

Herein we announce our latest proposition, which already is becoming popular with those to whom it has been explained.

At present a few of the largest firms are

getting blue-prints at two cents per square foot, but our system makes it possible for both large and small concerns to get prints at the same low price, by using one of our tickets after it has been signed.

Our selling these tickets places the business on a cash basis; all the benefits of this are used to lower the retail price of our work, which is two cents for blue-prints on medium heavy paper. Prices on other kinds of prints are proportionately low.

For those who do not wish to purchase tickets, we shall continue our present reasonable price of two and one-half cents for sun and electric prints.

Our workrooms are equipped with the latest apparatus, thus enabling us to turn out first-class prints in the shortest possible time.

PARKS & JEEVES,
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NOTES.

REDDING, BAIRD & Co., of Boston, were instructed by a unanimous vote of the class of 1903, Phillips Exeter Academy, to build their class window. It was quite a task to get it done in time before graduation, but it was done all right, and it will probably be accepted as one of the most beautiful windows in New England.

The centre is a mass of blue iris with their leafage, the blossoms in violet-blue variegated with gold. This is the class flower, and is emblematic of chivalry. It certainly is a most effective piece of work.

In the past few years this firm has been making many class windows and a good many windows for schoolhouses, allegorical and otherwise.

THE works of the National School Slate Company, of Slatington, Pa., have been equipped by the B. F. Sturtevant Company with complete heating and ventilating apparatus, using the hot-blast system. The air is drawn through a steam-pipe heater by a fan, direct-connected to a horizontal, side-crank engine. The heater is built in five sections, one of which is designed to use the exhaust steam from the engine.

OUR readers will be pleased to learn that the well-known firm of Blodgett Bros. & Co., 141 Franklin Street, Boston, has been incorporated under the name of the Blodgett Clock Co., a step which became necessary to properly care for the large amount of new business coming to this enterprising house. Among their recent Clock contracts are the Woodward Institute and Washington Schools, in Quincy, Mass., Dana Hall School, Wellesley, Mass., Edison Illuminating Co., Chase & Sanborn's New Building and Thompson's Spa, in Boston.

Their system of Self-winding Clocks certainly seems well adapted for every place where accurate time, with or without automatic programme signals, is desirable. Their success is entirely due to the old well-tried principle of square dealing and furnishing the best of apparatus at reasonable prices, which is good business policy in any line.

THE Duke of Marlborough, following the example of other progressive members of the British aristocracy, has ordered two electric elevators, with push-button control, from the Otis Elevator Company. These are to be installed in his city home, Blandford House, Curzon St., London.

THE N. & G. Taylor Co., of Philadelphia, are sending out once a month a series of illustrated blotters, referring to the "Taylor Old Style" roofing-tin.

DAVID CRAIG, of Boston, was elected Vice-president of the National Association of Plumbers at the San Francisco Convention just closed.

PRICE 15 CENTS

JULY 11, 1903

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI

* REGULAR EDITION *

NO. 1437

ARCHITECTVRE

ENGINEERING

DECORATION

211 TREMONT ST.

CONSTRVCTION

BOSTON MASS.

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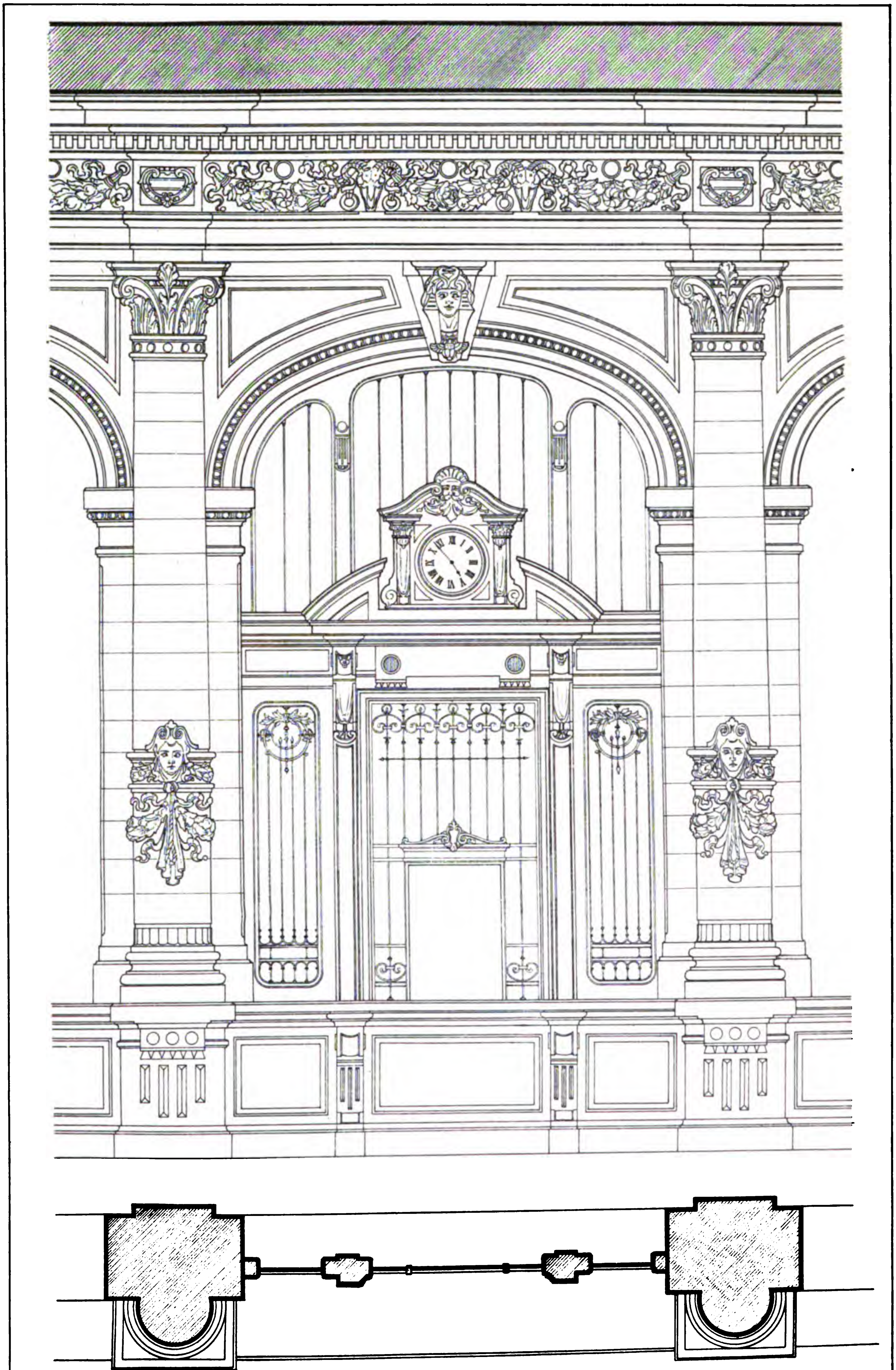

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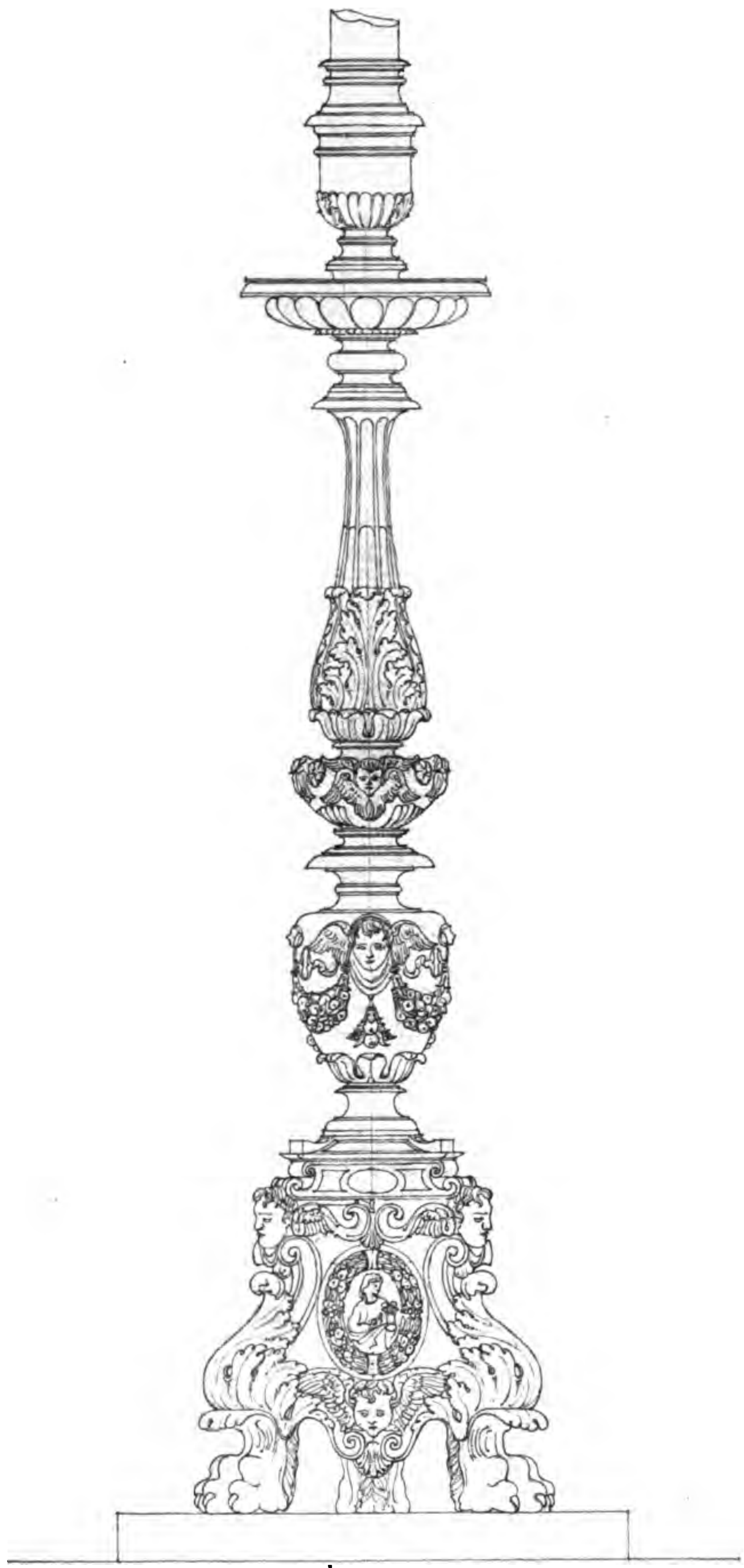

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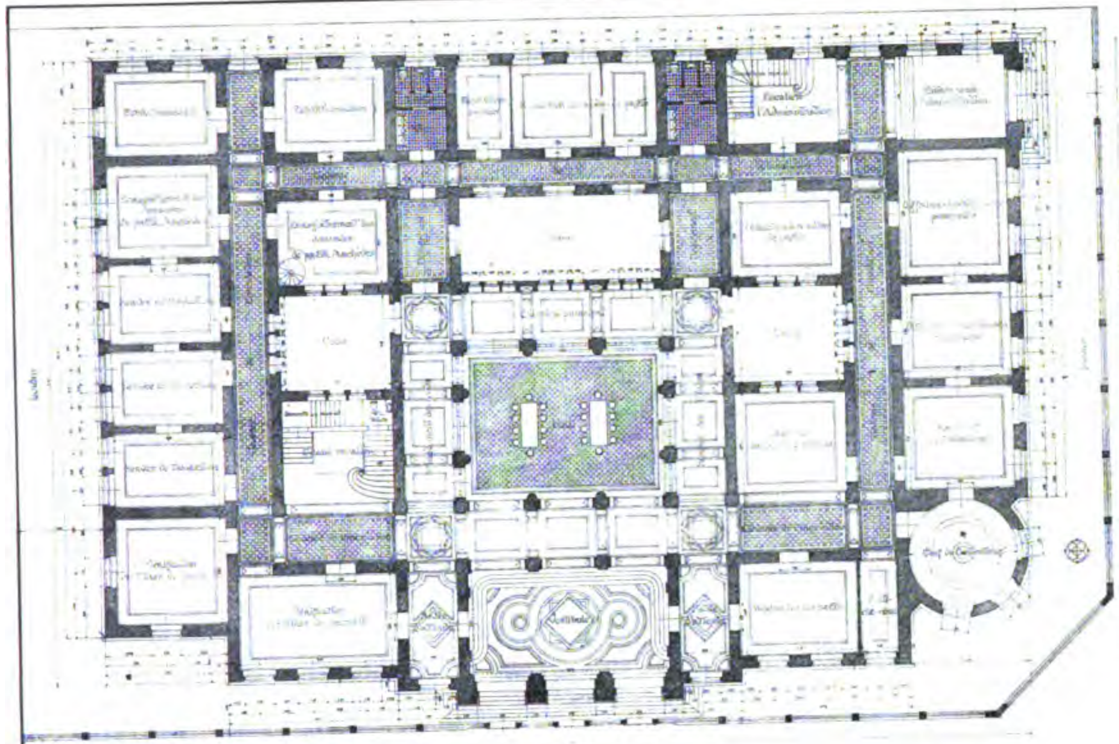

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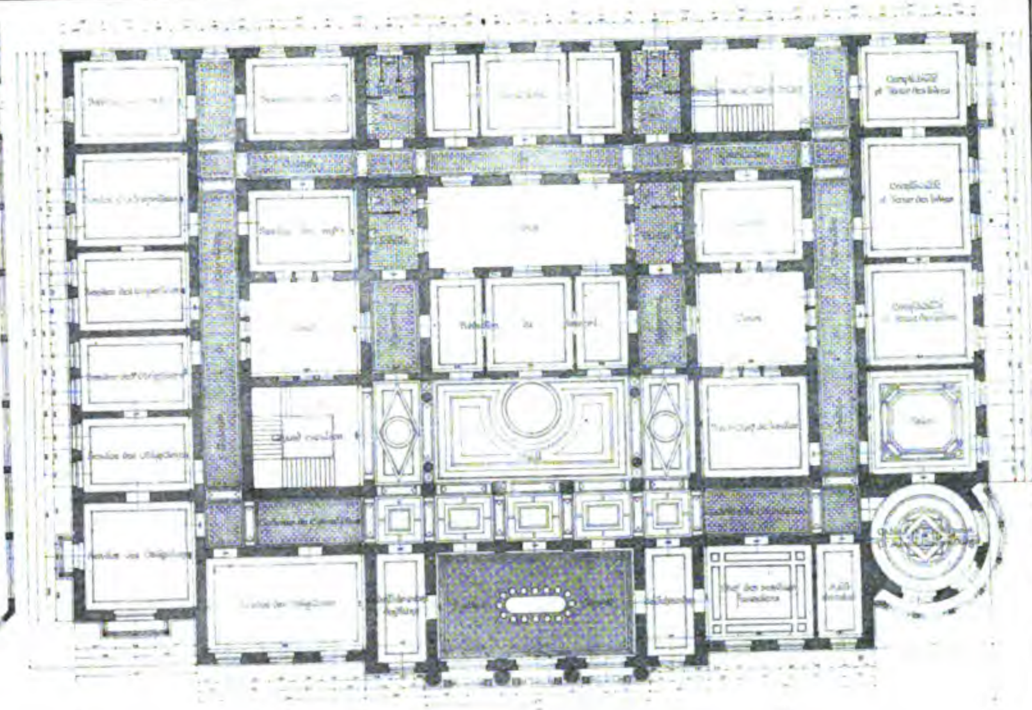

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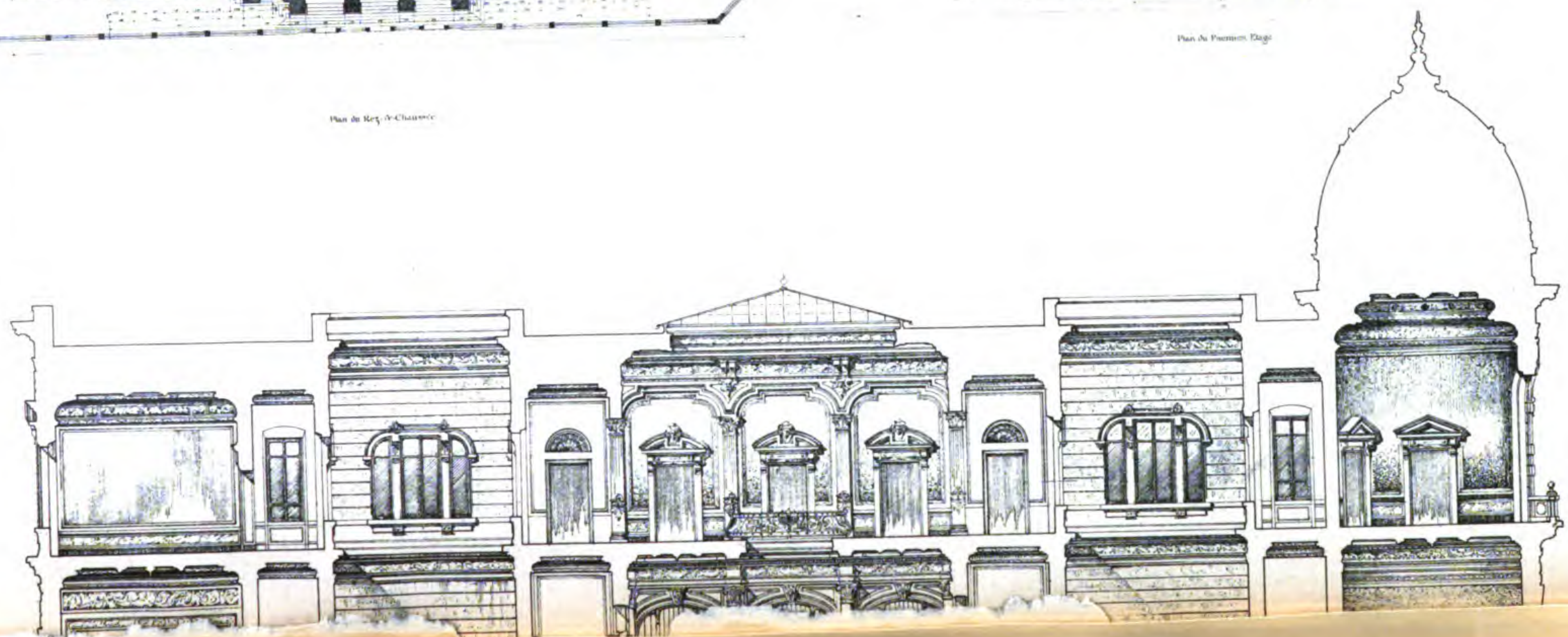

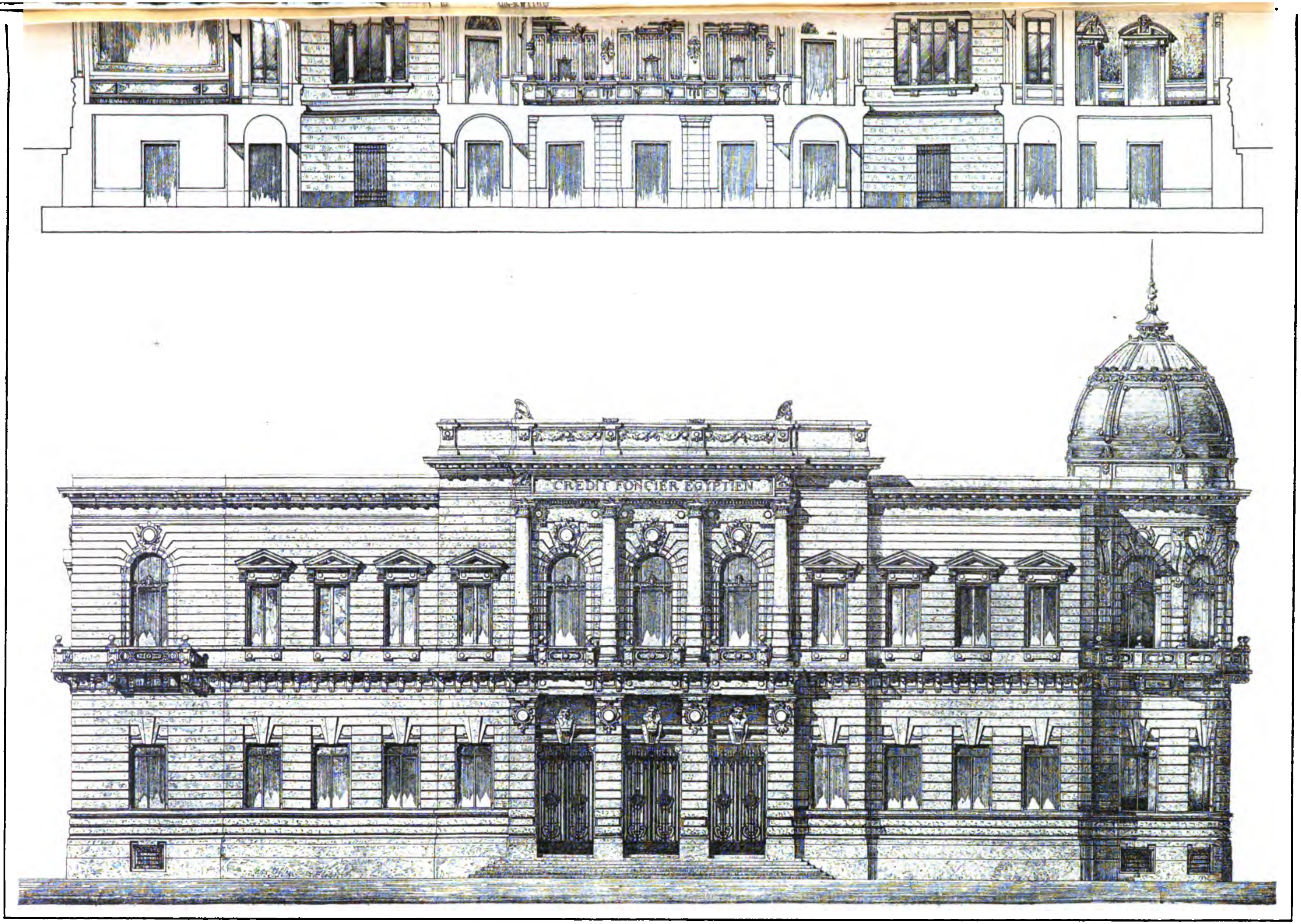

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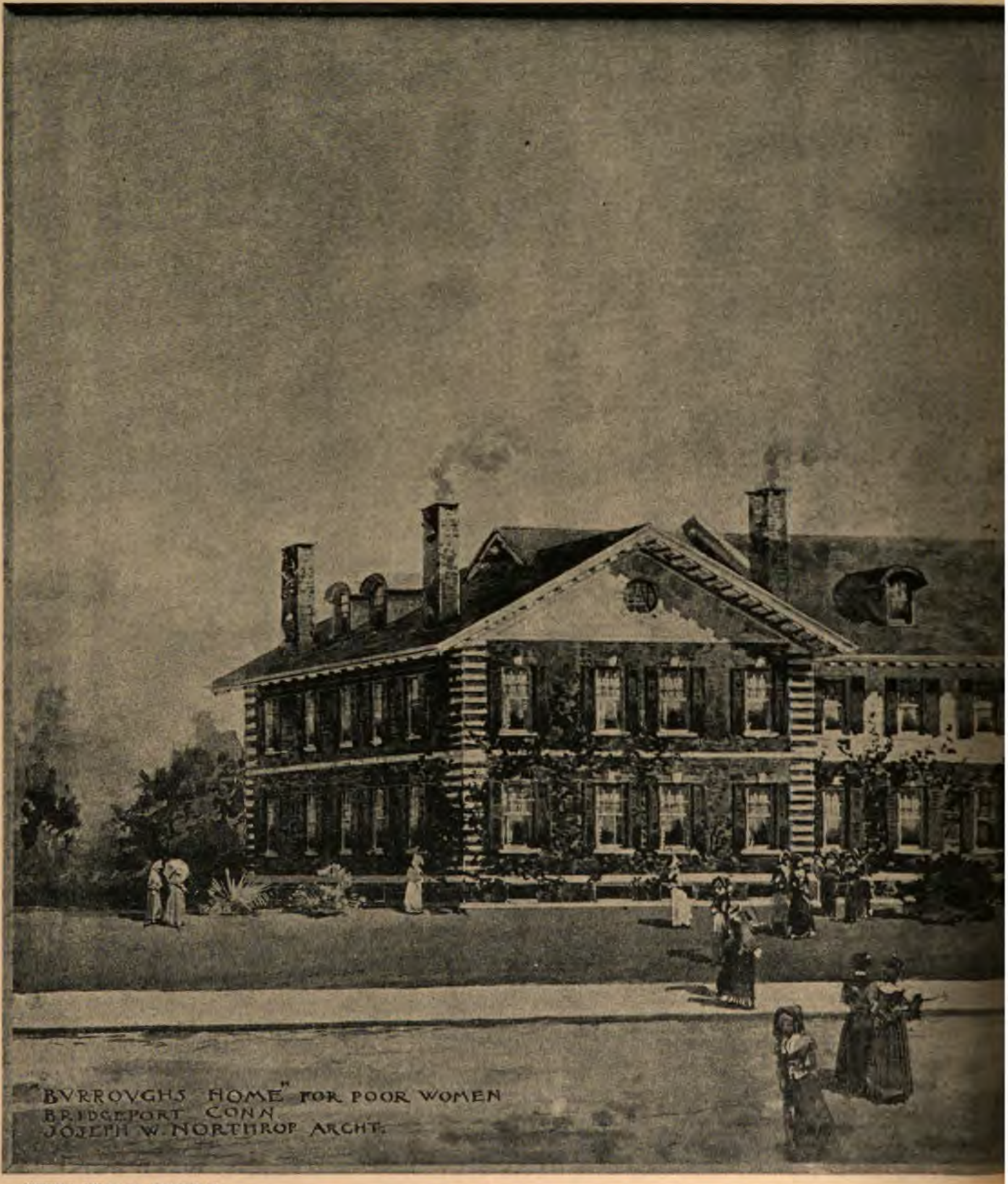
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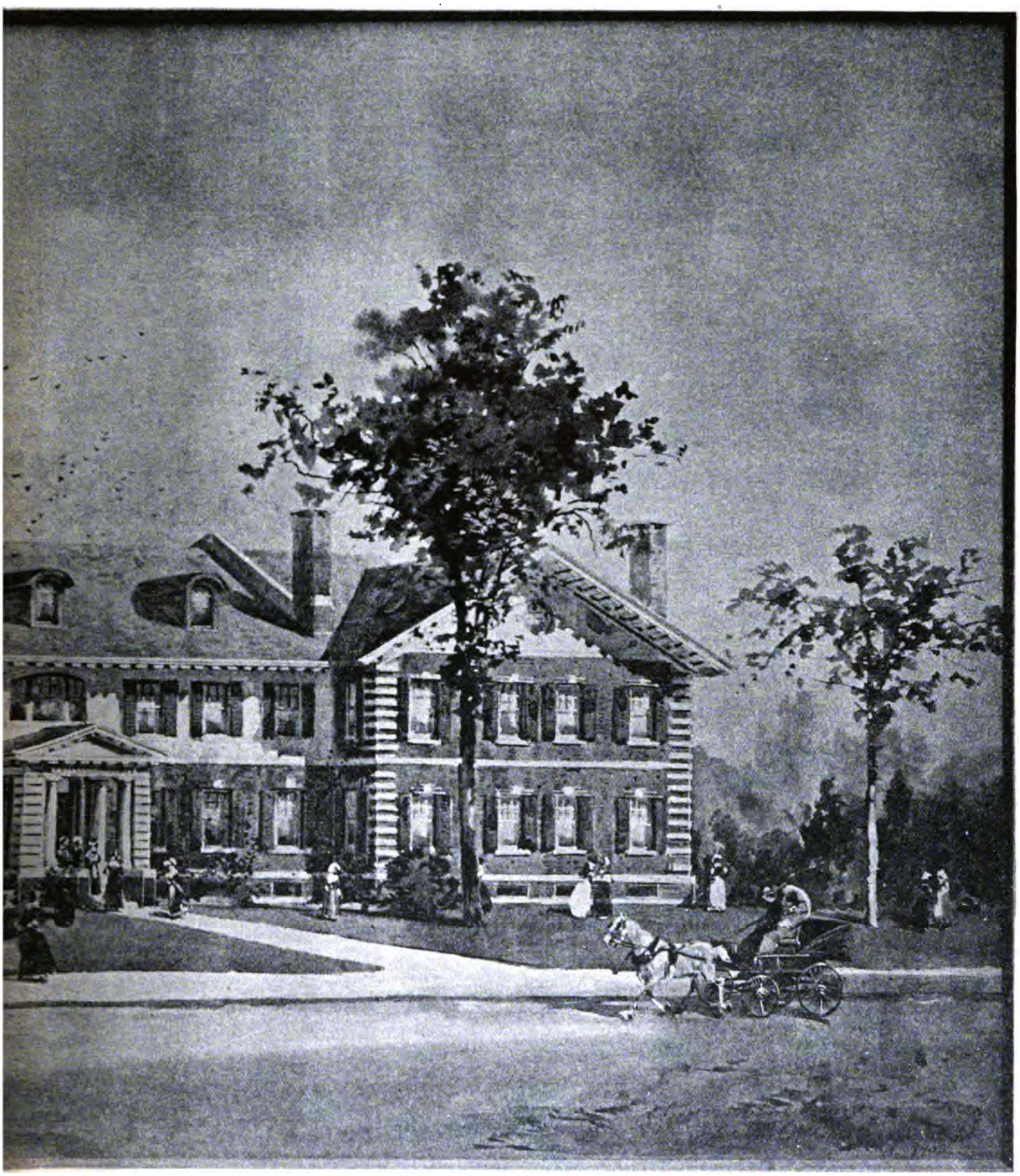

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THE AMERICAN ARCHITECT AND BUILDING NEWS

Vol. LXXXI SATURDAY, JULY 11, 1903 No. 1437

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A NEW element in the building situation in New York is the ratification of an agreement between the George A. Fuller Company, which has held aloof from the Employers' Association, and the allied unions, by which the Company agrees to employ only members of the allied unions, and to leave all controversies between it and its men to a board of arbitration of five members, two chosen by each side, and the fifth by the other four. In return for this, the unions agree to keep the Fuller Company supplied with workmen in the different trades. According to the newspapers, other contracting companies are considering similar agreements, but no names are given. Although great publicity has been given to the Fuller settlement, it does not seem to involve any large number of men, or any important point. Just at present, the Fuller Company, although it is carrying on extensive operations elsewhere, is doing very little in New York. Apart from an office-building on Broadway, which it practically owns, it has, according to the *Record and Guide*, contracts only for a printing-office, of no very great importance, the new Siegel & Cooper store, and, perhaps, one or two smaller buildings. In all these undertakings it employs four or five hundred men. It is natural that the Fuller Company, which has always prided itself on keeping on good terms with the unions, should wish to make a settlement as soon as possible, not only to keep up its reputation as a friend of organized labor, but, incidentally, for the sake of the gratuitous advertising which its action brings to it; and it is not impossible that, as other contractors hint, it may see advantage in a policy which is likely to lead to a transfer of contracts to it from other builders, who, being pledged to the Employers' Association, must suspend operations until a settlement is reached which will comprehend all; but, on the other hand, its separate agreement with the unions, by which it is bound to employ only union men, upon terms practically dictated by the walking-delegates, may prove highly inconvenient later. If the Employers' Association remains firm to the end, as is likely to be the case, the settlement will undoubtedly establish the right of contractors to employ non-union men. In this case the Fuller Company, being limited to union men, would be at a disadvantage in comparison with its competitors; so that its present action looks like a manœuvre in which it has staked a good deal upon the success of the walking-delegates, for the sake of a temporary advantage.

MR. JEROME has a case which, although by no means exceptional, happens to present a very clear issue concerning the right of unions to deprive non-union men of the opportunity to earn a living, and he proposes to carry it before the highest courts in New York. A certain walking-delegate found that trim not made by union men had been used in a building. The rules of the New York unions prescribe that all trim and finishing material used in the construction of buildings shall be manufactured by union men within the city of New York. The walking-delegate, acting under this rule, ordered that the trim should be torn out, or, if this was not done, that a fine should be paid. The contractor chose to pay the fine, and the walking-delegate received the money. The delegate, who seems to have been perfectly honest, required the contractor to write a letter, stating the reason for which the fine was paid; and, so far as is known, the union duly received the money. The principle to be determined is, however, whether the union could lawfully establish such a rule, or require the payment of a fine for violation of it; and the decision of the Court of Appeals on this point will be awaited with the deepest interest. As every one knows, the practice of unions, in prohibiting their men from handling or transporting goods made by non-union men, has given them great power of distressing, not only non-union men, but the public, and this power has been used without scruple. Occasionally, the public, tired of being continually put to injury and inconvenience in furtherance of the schemes of labor leaders, has rebelled, and we think that non-union goods must, at least, be transported in some States without discrimination; but much is yet to be done before American citizens will enjoy the right to which they are entitled, a right far more precious than that of liberty of conscience, — that of working for the support of their families at such honest employment, and on such terms, as they may find fit, without molestation or hindrance from any one.

MR. GEORGE S. MORISON, one of the most distinguished of American engineers, died a few days ago in New York. Mr. Morison was educated as a lawyer, graduating from Harvard University in 1863, and from the Harvard Law School in 1866. He was immediately admitted to the bar in New York, but preferred to devote his brilliant talents to the more congenial problems of engineering, and, a year later, was employed as an engineer in Kansas City. He spent several years in the West, where he was constantly employed in works of the most important character. He built five bridges across the Mississippi River, and ten across the Missouri, one of his Mississippi bridges, that at Memphis, having the third longest span in the world. He was also skilled in certain departments of mechanical engineering, utilizing his knowledge in studying the conditions of railway systems, in which he was a distinguished expert. In 1898, he was selected as the engineer member of the Isthmian Canal Commission, and his clearsighted conception of the subject undoubtedly contributed to the remarkable success of the work of that Commission. He served as President of the American Society of Civil Engineers, and was a member of many professional and scientific organizations, at home and abroad.

THE designs for the Manhattan Bridge in New York have been utilized politically in a curious way, as appears from a very interesting letter to the *Evening Post.* Commissioner Lindenthal, as our readers know, has had plans prepared for a bridge in which the suspension members consist of chains of enormous eyebars, and strongly urges the adoption of this scheme by the Board of Aldermen. On the other hand, plans were prepared nearly two years ago for the same bridge, in which wire cables were used for suspension, as in all the large suspension bridges now in existence. Each system has its professional advocates, but the opponents of the chain can make the strong point that no large bridge has ever been built on this system. On the other hand, those who favor Mr. Lindenthal's plan talk with the positiveness which generally attends the advocacy of experimental schemes, and accuse their opponents of being "in the pay of the Roebling Company," while Mayor Low, and other high officials of the present reform administration, naturally, although perhaps incautiously, take the same side. Meanwhile, the Tammany members of the Board of Aldermen oppose the chain plan with a singular unanimity, of which the *Evening Post's* correspondent furnishes an explanation.

According to him, the Tammany element in New York politics would really like nothing so much as to see Mr. Lindenthal's plan adopted, against their ostensible opposition, for the sake of the political capital which they would derive from it. There is in this country, as he says, no establishment capable of forging and testing the eye-bars for Mr. Lindenthal's chain; and, if his plan is adopted, a plant will have to be specially constructed for this purpose, at a cost of several hundred thousand dollars, which will, of course, be added to the price of the chain, as the plant would be of no value for any other purpose. It is already estimated that the chains will cost five million dollars more than cables of equal strength; so that this item alone would serve as an admirable campaign argument against the reform administration, which was put into power by the people who desire economy and common sense in municipal affairs. This is not all, however. Mr. Lindenthal, instead of arranging for separate contracts for the cables, as has been usual, has combined the towers, anchorages, floors, chains and other portions of the superstructure in one contract. Remembering that there is but one concern in this country which can build the plant, and furnish the chains, that is, the Steel Trust, it is obvious that Mr. Lindenthal's arrangement, without necessity, and in violation of long-established precedent, throws the whole contract without competition into the hands of the most powerful of American trusts. This alone would furnish the opponents of the present administration with a great store of political ammunition; but by enlisting in aid of their arguments the popular hatred and suspicion of trusts, there is reason to think that the Lindenthal bridge may be utilized so effectually as to secure an adverse majority at the polls next autumn. This would be a public misfortune; and the *Evening Post's* correspondent makes a suggestion which appears both sensible and prudent; saying that, as the Board of Aldermen has not only approved the cable plans, but appropriated the money for carrying them out, it is hardly judicious for the new administration to commit itself, in opposition to the judgment of the previous one, to what is, after all, simply a theory of a single engineer, or a small group of engineers; and that it would at least do no harm to have both plans estimated, in the interest of the citizens, and, on ascertaining the comparative cost, judge as dispassionately as possible whether the chain bridge was worth the additional expense. In this way the cost of the chain bridge would probably be materially reduced, by competition with the cable bridge, and the opposing party would be deprived of the opportunity for charging against the reformers a transaction which the worst Tammany administration never would have ventured upon, in arranging, without necessity, and against the opinion of distinguished engineers, as well as the experience of the city, to throw one of the largest municipal contracts ever entered upon, without competition into the hands of the largest and, except the coal combination, the most execrated of the trusts.

The Act providing for the work preparatory to the construction of the Charles River Dam, in Boston, has been passed by the Massachusetts Legislature, and the dredging out of the water-courses in the Fens, with the permanent exclusion from them, and from the Charles River basin, of all sewage, must, under the Act, be begun at once. The actual construction of the dam cannot be carried out, or even ordered, until the War Department at Washington has given its consent; but it is understood that this will not long be withheld, and the Act empowers the Commissioners in charge to complete the work as soon as permission is obtained. The scheme, as now adopted, is an admirable one, providing for a high-level dam, which will shut out tide-water, making the Charles and its tributaries fresh-water streams. The dam itself is to be one hundred feet wide, and is to be laid out as a park; and the shores of the basin are also to be formed into parks. The present Charlesgate is to be reconstructed, and made, we trust, artistically creditable to the city; and other important changes will naturally follow from the establishment of a permanent high level in all the waters above the dam.

It appears that the sale of the Park Street Church property, in Boston, and the demolition of the beautiful building on it, was only postponed by the failure of the attempt made last winter to carry the scheme through; and a new syndicate has made propositions which the owners have voted, by a very large majority, to accept. As there is now no probability that money enough can be raised to preserve the church in its present location, the alternative seems to be to buy the building and remove it to a different lot, probably in some portion of the Back Bay region restricted against mercantile business, so that it may remain undisturbed for at least another century. There would probably be no appreciable difficulty or inconvenience in moving the building, either to the Fens, which seems to be the most suitable location, or to unoccupied land nearer the business quarter, perhaps on Park Square; and it is certainly desirable to preserve it. So far as the historical objections to moving it from its present site are concerned, it may be observed that, while they should have every possible consideration, there are precedents enough for the migration of historical monuments to make such a change at least preferable to a total loss of the structure. The Plymouth Rock, for example, loses very little of the veneration which it merits from the fact that it has been repeatedly shifted, and now rests at a considerable distance from the place where the Puritans found it; and similar peregrinations of objects of popular interest have been common at least since the seventh century B. C., when the first Greek colonists of Sicily, upon landing on the shores of their new abode, were agreeably surprised to find that the Arethusan spring had followed them under the sea from their old home, and was bubbling as clearly as ever in the foreign soil.

The statistics of importation of iron for the past fiscal year show conditions of much interest. In two years the value of iron imports has about tripled, rising from seventeen to fifty million dollars. Of this increase the greatest, proportionally, has been in "railway-bars," structural steel being, presumably, included in this item. The figures show that, in 1901, the value of the imports under this head was only forty-three thousand dollars; in 1903, the value will be about three millions, — an increase of about seven thousand per cent. In pig-iron the value of imports has increased from one million to fifteen; in scrap iron, from three hundred thousand to nearly two millions, and, in ingots, billets and other partly manufactured material, from one million to nine millions. Apart from these items, the value of imports has varied little. The obvious conclusion from the figures is that the great volume of imports is due mainly to the pressing demands upon American manufacturers of finished products, who, on account of the impossibility of getting iron here within a reasonable time, have been obliged to import it from abroad. In structural steel, as we know, several contracts for frames have been placed in Germany, and the promptness with which the steel has been delivered, and the neatness and precision of the framing, have produced such a favorable impression upon architects and builders that the transactions are likely to be repeated, notwithstanding the duties and the cost of importation. On the whole, the showing is favorable, as indicating the continued prosperity of industries in this country; and, while the building world generally attributes the present stagnation in construction to a suspicion, on the part of the public, that present prices of material and labor are artificially raised, and cannot be maintained, it is probable, considering the general prosperity, that a small concession would materially revive building business.

Every admirer of the Metropolitan Park system of Massachusetts, which reserves for the use of the inhabitants of Boston forever the most beautiful natural scenery in the neighborhood of the city, will be interested in the modest memorial which it is proposed to erect in the Blue Hill Reservation, near the highest point of the park system, to the late Charles Eliot, to whom, more than to any one else, is due the development of this splendid work. Only three thousand dollars will be required to complete the memorial, which is to be in the form of a bronze tablet, attached to a simple stone footbridge, crossing a ravine at a point in the path encircling the summit of Blue Hill from which a view is obtained over the greater part of the Metropolitan park system. Nothing could, perhaps, be more appropriate as a monument to an artist in landscape who always deprecated the intrusion of buildings or other architectural creations into parks; yet few monuments could be more imposing than the vast sweep of the park system, as seen from Blue Hill, with which his name will be in this way connected. The greater part of the sum required has already been raised, but those who would like to add their names to the list of contributors are requested to send their subscriptions to Mr. Charles S. Rackemann, 23 Court Street, Boston.

LESS WORK IN CHICAGO THAN ELSEWHERE. — THE MOVEMENT FOR ENLARGED PARK AREA. — THE PROPOSED FIELD'S MUSEUM AND THE LAKE FRONT. — PLAYGROUNDS. — SALE OF THE FERRIS WHEEL. — THE CARAVELS IN JACKSON PARK. — A SUBWAY MOVABLE SIDEWALK. — THE ANNUAL EXHIBITIONS AT THE ART INSTITUTE.

THOUGH Chicago, as well as the rest of the country, may be enjoying prosperity, as said in my last letter, the high price of building-material and the attitude of the laboring world so discourage building operations here that it has been calculated that over thirty per cent less work is being carried on this year than last. In 1903 622 permits were issued, the buildings costing $3,317,200. In 1902 566 permits were issued at a cost of over $5,245,125, which means a decrease of thirty-seven per cent in expenditure. If other large cities were affected in a similar way it would not be so noticeable, but the increase in building in 1903 over the amount done in 1902 in nearly all cases is large. In New York there has been a gain of nineteen per cent, in Philadelphia three, San Francisco 131, Detroit 187, Cincinnati 178, Washington eighty-two, Milwaukee seventy, and so the list continues, the gain being almost invariably on the side of 1903. The facts of this report are borne out by the conditions in architects' offices, for while the large offices, such as Burnham & Co.'s who are doing work, not only in Chicago, but anywhere from New York to San Francisco, are full of activity, the majority of the offices find the work unusually slack.

Chicago, which has heretofore been considered a city rich in parks, is now agitating the question of constructing still more. The proposition of pushing the north end of Lincoln Park farther out into the lake on made ground, has been put to a vote, and though, to many, it would be a drawback to change the present shore-line, yet the urgent need for greater space in this especially crowded pleasure-ground has outweighed any other consideration. To read the plans published from time to time in the papers, one would almost be led to believe that nearly every desirable spot within twenty miles of Chicago was about to be bought up for park purposes. Every large city needs parks and none more badly than Chicago, with its noise, its dirty streets, its smoky atmosphere. To make Chicago at all bearable as a place of residence everything must be done to make it easy for its citizens to get away from its centre. Last week a new park bearing the name of McKinley was opened in the southwestern portion of the city. This is more in the nature of a playground than a park given over to landscape-gardening effects. It has taken only two years to transform it from a cabbage patch into its present state. It contains thirty-five acres, fifteen of which are used for a ball-field. Smaller portions are set aside for tennis-courts, wading-pool for children and swimming-pool for older people.

It now looks as if what is to be known as Grant Park, the former "Lake Front" of local parlance, would materialize into a feature of beauty, and that we might be able to have Mr. Field's multi-million dollar building for the museum placed upon it. If it could be certain that this Field Museum Building would be beautiful as well as solid and substantial greater enthusiasm might be evinced. The Art Institute, one of Shepley, Rutan & Coolidge's buildings, has always been a delight, placed as it is on the northern end of this Lake Front, but if we must have just so many thousand square feet of building sent out from some architect's office and dumped on the Lake Front to cut off the view, it certainly is questionable how desirable it would be. Half of the local architects have been eager for years to build themselves monuments on this same Lake Front, and when political pull comes into the question it is not always an assured thing what will be the result. It has been quite noticeable, this last winter, in all the talk of a permanent home which it was desired to build on Michigan Avenue for the Chicago orchestra, that constant references have been made to the Parthenon, and comparisons have filled the air, as to how this building would be a crown to Chicago as the Parthenon was to Athens. No citizen of Chicago would ever regret the crown, provided it were to be of the right size and proportion; but to have it so one would need to start with a dictator of sense and refinement, which would mean first catch your Pericles, and then would follow the necessity for a Phidias, an Ictinus, and a Callistratus in the background. Certainly, from preliminary sketches published, no such overwhelming galaxy of talent was made apparent in the decidedly commonplace Italian Renaissance façade of the proposed building. Neither was there, so far as was generally known, any great rush among the men of the architectural profession to subscribe liberally to this proposed "crown." Though there has been no official announcement that the scheme has been given up, the matter seems to have been dropped for the time being at least, and it is to be inferred that the needful sum was not raised.

The President of the South Park Board has recently given hints as to plans seething in the official brains. One million dollars has been set aside for playgrounds, and ten more such parks as the McKinley pleasure-ground, before mentioned, may soon be equipped, ready for use by the children. The President has urged the acquirement of property for the establishment of an outer belt of parks along the Calumet River, the valley of the Des Plaines and the divide to the Skokee Valley, the line to turn east and strike the shore somewhere in the vicinity of Winnetka and thence south, *via* Sheridan Road, to Lincoln Park. This is a dream of the future, but would certainly take in nearly all the various features of natural beauty around Chicago.

A propos of the park talk, it has been rather amusing to have some of our treasures left over from the World's Fair brought into notice again by the Commissioners in connection with their possible sale.

That poor old statue of Columbus, which many of us thought was ornamenting some rural park, it seems has been reposing on the rubbish heap all these years in Washington Park. It was proposed this year by the Commissioners to have a "rummage sale" and to offer to the unsuspecting public bargains in Ferris Wheels, Columbus statues and Spanish Caravels. The Ferris Wheel, which for several years past has been losing money for its owners, in a small beer-garden on the north side, was first to accomplish a sale and was knocked down under the auctioneer's hammer to the highest bidder for $1,800. This is rather a low figure when one remembers that the original cost of the wheel was $362,000 and a trifle discouraging, too, when you are told that there are $300,000 of bonds outstanding against it and a further indebtedness of $100,000. Thus is this marvel of engineering skill destined to become old junk in the hands of its new purchasers. It has not been reported that the bronze expanse of poor old "Columbus" has proved attractive to any one, and public sentiment drew the hammer away from the caravels before it was too late to save these picturesque objects for the lagoon where they lie. When the caravels were given to the park a certain sum of money went with them from the Government, if our memory serves us correctly, to keep them in order. Whether this money has ever been expended it is hard to tell, but certainly they are in a very dilapidated condition at present and a menace to every one who goes near them. Yet with it all they are by far the most picturesque objects in the park. Seen at sunset on the lagoon they are really beautiful and it seems a great pity they should have been allowed to fall into the state of decay in which they now are. The picturesque sails have been used to cover the little Japanese houses, which were left from the Fair on the Wooded Island. Jackson Park is not as yet a beautiful park. Its trees are small, its spaces large, generous and sweeping, but with no striking objects of interest to hold one's attention. The impression of the park is that of an excellent low-toned background which, to have any value, needs some highly colored or characteristic objects in the foreground. Just such objects exist in the German building, the little Japanese buildings on the Wooded Island, and the Spanish caravels, and that any of them should have been allowed to fall into a state of dilapidation is more than a pity. Why! the caravels are worth more to Jackson Park than fourteen cages of wild animals, but should such a gift have been made, no doubt it would have been "kept up" to the last notch. In view of just such sentiments as these, the Park Commissioners withdrew their offer of sale, but that the poor old ships are to be better cared for in the future remains yet to be seen. When the question of selling the vessels came up, numerous quaint belongings pertaining to them were brought to light. Twenty very decorative flags were discovered, six large and two small cannon, chains, powder-flasks, stone cannon-balls, shields and arquebuses. Had the good condition of the caravels been maintained these articles would have made the old ships doubly interesting.

Another subject which brings up memories of the World's Fair days is the scheme for placing one of the movable sidewalks, such as was located on the long pier in 1893, in a subway under the main business streets. A company under the name of Multiple Speed and Traction Company of Chicago is now working for a franchise with the City Council. As those who were at the Columbian Fair will remember, the movable sidewalk consisted of three platforms moving at different rates of speed. From these graded platforms passengers could step till they reached the last one, which went at the fastest rate of speed, and on which there were seats. It certainly would be a novelty in the transportation line. As yet it is only a scheme in the minds of the promoters, and in the minds of other people liable to remain so, though it certainly has some good points.

With the closing of the school year the Art Institute makes its usual display of students' works and never before has the school made such a strong showing. It is a matter Chicago can well be proud of. The exhibition is equally interesting from the work of the juvenile classes right through the department, architectural drawings, design, applied design, which includes work in pottery, jewelry and baskets, modelling, drawing from casts — still-life, nude and draped models. A slight change in the system has been adopted during the last year. The advanced students work in different *ateliers* with a special master and the exhibits are made in these groups. Several pictures of much merit have been the result of this year's work and actual picture-making by those who can draw seems no longer to be discouraged.

The exhibition is unusual in its strength and evinces an ability and enthusiasm on the part of the students which speaks volumes for the school.

The annual exhibition of the Architectural Club held in the Institute this spring was carried along legitimate lines more strictly than it was last year, and the result was a more dignified whole, though doubtless it took the fancy of the general public less than did

the cat-tails and ceramics of last year. It was an exhibit of serious work and contained much of merit and worth.

PROTECTION AND PRESERVATION OF WOOD FROM FIRE AND DECAY.[1]

THE problem of wood protection, of converting it from a highly inflammable into an absolutely non-inflammable product, has floated before the minds of generations of men rather as a vague, dreamy proposition than as subject-matter upon which to concentrate intense intellectual attention. Sporadic efforts void of practical utility are historically recorded at irregular epochs, from Roman days to the present time.

So little is known by the general public of the practical results achieved in the line of protection of wood from fire that it is a tax upon its credulity to ask it to believe that the wood of a structure can simply, rapidly and cheaply be rendered as uninflammable as brick or stone. It is even likely that such a statement may be questioned here and now.

It is not claimed that wood cannot ultimately be disintegrated and destroyed by attacking flame, as we know brick, stone and steel may be; but it is claimed that wood may be so treated, and that the wood before you is so treated, that, upon the withdrawal of such flame, it will not of itself, except perhaps momentarily, hold flame, whether in beam, board or splinter. If this be literally or even measurably true, what is its significance?

Many years ago, in a great fire on Chestnut Street below Third Street in this city, the heat was so great as to disintegrate enormous masses of the granite walls. If wood is robbed of its inflammability, it is voided of its most serious objection in a structure.

If the wood in a building will not inflame from fire attack, but only slowly disintegrate, as other uninflammable materials will from contact with fire, then the contents of the building alone can be destroyed by fire in the building. Further, if the contents of a room inflame and the wood will not, then the fire can be localized, because the wood will not receive or transmit flame.

The elimination of the inflammable characteristic from wood is therefore a matter of vital consequence. And such treatment, further, as shall cause it to resist disintegration from fierce heat the greatest length of time, without at any time inflaming, must be the most desirable.

The sum of values arrived at, as a resultant of all recorded study, inventions and scientific deduction, up to the beginning of the present decade, as to protective treatment of wood, may be stated as: —

1. That wood is susceptible of absorbing varied percentages of liquids.
2. That certain chemical solutions, when injected into the cellular structure of wood and afterward dried, leave a residual deposit of dry chemical therein, from which, with water, the solution was originally formed.
3. That such impregnation may be effected by pressure mechanically applied and by incidental processes.
4. That such deposit of chemical substance in the wood-cells has in one case a preservative and in another a fire-resistant effect.

Practically, this formula condenses the whole state of the art up to a very recent period. The mechanical saturation of wood is really a new art. It found its first concrete development less than thirty years ago, in apparatus designed to saturate timbers with preservative solution. Previously abortive efforts had been made on a smaller scale, but were of no practical account.

Strangely enough, the preservative proposition claimed first attention; and as the work to be done required capital, capital called upon the engineer to formulate the apparatus with which to saturate the wood. The original theory of saturation, in its processional steps, is practised to-day with but slight modifications.

Fourteen preservative plants exist in this country, five in England, three in France and five in Germany, as reported. All have the original typical apparatus and system of saturation, so far as can be ascertained.

The belief prevailed, and prevails, that the interfibrous and cellular system of wood contained elements denominated sap, which according to recognized authority was vicious, and generative of destructive fungus. No distinction seems to have been made between the *real sap*, the solid deposit, and the *sap water* which came to the tree heart from the ground laden with vital power, performed its function, parted with its tree food, and failed to find its way as simple water into the atmosphere, only because the tree was cut down.

This *sap water* is very favorable to the propagation of germs, and is therefore really an undesirable element in wood. But the sap water is very small in amount in lumber cut for any time, and there is no reason whatever for any effort to eliminate it. For if the preservative solution is of any strength or value, it will impregnate such sap water and utterly destroy any germinative tendency. But the fact is that every effort is actually made to liquefy the *real sap*, the soul of the wood, and suck it out by vacual extraction.

The real bottom fact of the matter is that the original creator of the theory of saturation realized that, in sappy woods like yellow pines, the sap, being in such large volume, would resist saturation, and the only way he could see to get over the difficulty was to liquefy the sap by steaming, and exhaust it by the vacuum-pump. Within the last two years a statement was made in a scientific journal, describing this process, that this result was so successfully accomplished as to "leave the wood in a condition of a finely divided honeycomb." Comment on such a statement is superfluous.

The steps of process by this original method of saturation are, after the cylinder is charged: —

1. To introduce steam to liquefy the saps.
2. After prolonged steaming, to remove by vacuum-pumps the substances so liquefied, the operation requiring many hours.
3. To fill the cylinder with the preservative solution, allowing it to impregnate the wood, so far as it will, by its own infiltrative action.
4. Then applying hydraulic pressure to complete the saturation.

This apparatus and process mark the first systematic effort to produce a commercial result in the saturation of wood, and it has been continued from the first until now, with immaterial changes, as the universally adopted type.

That the business of preservative saturation has not obtained universal acceptance may proceed from several causes: —

1. The process of saturation occupies undue time, rarely taking less than from twenty-four to thirty hours for a charge.
2. Heart saturation in timbers of moderate square section is incomplete.
3. It is believed that the strength of the wood is seriously impaired by the processional steps, steaming and exhaustion of the liquefied sap.
4. The chemicals put into the wood, being excessively dilute, are ineffective.
5. That the exposure to atmospheric influence causes them to volatilize.
6. That the cost for such a modified result is excessive.

At any rate, it is manifest that the growth of treatment of wood with preservative is sluggish, and not at all in proportion to the advance in price of such woods. It would seem that, if it were clearly demonstrated that ties, piles and bridge-timbers could be saturated at reasonable cost with a preservative which would treble or quadruple their average life when untreated, in a country like ours one hundred plants would scarcely suffice to meet the demand, instead of fourteen in thirty years.

The advance in cost of ties, owing to the great railroad development of the country and rapid exhaustion of the timber, has, however, induced a number of the Middle West and Western railroads to put in plants of the old type, to treat ties, and their growing use is evidence that it is found an economy, even with the crude apparatus and an expensive chemical.

Observation of the operation of the mechanism and processes employed, and a study of wood and its susceptibility to absorption of liquids, led to the conclusion that the desired results could be obtained by much simpler mechanism and an entire reversal of process. The old form of apparatus consisted of a cylinder of from 62 to 84 inches diameter and from 85 to 112 feet long, closed at one end, having a massive door at the other, swinging either horizontally or lifted vertically. This door is fastened by a multilocking system of bolts passing through lugs on the periphery of the cylinder.

It is obvious that an external joint of from 62 to 84 inches diameter which has to be opened, say, once or twice every twenty-four hours presents a practical difficulty of great significance when it is desired to make it absolutely tight against any considerable pressure from within. If it leaks badly, no uniform pressure can be maintained. Further, perfect saturation, even of 1-inch-thick white-pine boards, cannot be effected in any practical time unless a pressure of at least 175 pounds is applied for several hours, no matter what preliminary process may have been employed. If a pressure of 175 pounds is put on the 84-inch gate-area, it has been found impossible to maintain a tight joint and even pressure. If much leakage occurs, the pressure pump must make it up, and, in speeding up, its reciprocating shocks, delivered against wood whose exterior surface has been softened by previous steaming, exert a most damaging and disastrous effect.

Therefore, the method of employment is to use, as that part of the process, a lower pressure, and avoid the rupture of the joint and damaging compression of the wood; but this is accomplished only at the cost of a great extension of time.

The new method wholly abandons all preliminary process. It was found from long practical testing that it was erroneous in principle, uncalled for, enormously expensive and practically ineffective.

As stated in published descriptions, saturation of boards and planks by the old system required from twenty-four to forty hours.

The new mechanism is, instead of a cylindrical body of 84 inches diameter, 50 inches in diameter and 112 feet in length. The cylinder body is made up of cast-steel flanged sections, 2¼ inches thickness of metal, with a special hydraulic joint at the flanges capable of enduring a hydraulic pressure of 1,000 pounds per square inch.

At each end is a domed gate, with a vertical hydraulic cylinder superimposed, which operates a vertical gate-valve weighing five tons. The gate is provided with phosphor-bronze rings as also the inner and outer guide surfaces. When the internal operating pressure comes upon the gate, these ring surfaces coincide, and the joint is perfect, whether with ten pounds or 1,000 pounds pressure. The

[1] Extracts from a paper by Mr. Joseph L. Ferrell read before the Engineers' Club of Philadelphia and published in the *Proceedings* of the Club.

greater the pressure, the tighter the joint. In this case it is the reverse of the old externally applied gate.

Furthermore, all possibility of communicated shock from the pressure pump is obviated by the interposition of an hydraulic accumulator loaded to the normal saturating pressure of each kind of wood. For white pine the normal saturating pressure is 300 pounds; yellow pine, 350 pounds; ash, 400 pounds; chestnut, 400 pounds; beech, birch and maple, 450 pounds; oaks, 650 pounds; and the direct saturation in this machine of 1-inch thickness of these woods can be performed under these pressures because of the absorption of shock from pressure-pump, with perfect results to the wood, and in a small fraction of the time required by the old system.

The wood is simply taken as it comes from the source of supply, put in the cylinder, the gate is closed, the cylinder is run full of saturating liquor, pressure is applied, liquor is returned to the tanks, the lumber is run into dry kiln, and another charge of lumber is run into the cylinder.

The process is identical whether the wood is saturated with preservative or fireproofing solution, with this exception: The growth of experience demonstrated that the criticism of engineers regarding the non-permanence of the preservative solution hitherto injected into ties, piles, beams, etc., was a just criticism. It *would* seep out, slowly perhaps, but inevitably, under varying atmospheric conditions. For instance, several railroad companies having tie treating plants believe that chloride of zinc most effectually acts as a fungus-destroyer. Chloride of zinc is an expensive chemical, costing from five to six cents per pound. Therefore, to be able to use it for their purpose, and not make their product too costly, they use a very dilute solution. In its dilute form the residual protective matter left in the wood is so slight that successive rains and evaporations in a relatively short time exhaust the infused material, — wash it out. Practical investigation having positively confirmed this it was believed that for wood exposed to weather conditions no treatment would be permanent except such a one as would create a chemical double decomposition in the interior of the wood. Three years of continuous investigation resulted in the production of an apparatus applicable to the treatment of railroad ties by a wholly new method. This consisted in saturating them *individually*, instead of in mass, which can be done with great speed and absolute thoroughness and uniformity. . . . .

The saturation of wood to make it *fire-resistant* differs in many respects from preservative treatment. Wood treated to make it fire-resistant is subjected to many stringent requirements not essential in the case of preservative. For instance, the saturation must be complete to the heart. The *color* of the original wood must not be impaired. The *strength of fibre* must be preserved. There must be no lingering of flame on withdrawal of attacking flame. To effect this, the strength of solution must be as high as possible. This, of course, adds to the cost and the density of solution requires greater pressure to infiltrate.

The "state of the art" at the time this work was begun embodied the employment of the original apparatus above described and processes therein exhibited.

This chemical, superficially studied, seemed to be all that could be desired. Wood saturated with it certainly would not *inflame*. Shavings planed from it would carry no flame. The treated wood would discolor more or less, but the refusal to carry flame seemed so admirable a result that such a defect seemed trifling. Longer acquaintance, however, destroyed the illusion. Familiarity bred contempt. Sulphate of ammonia is a whited sepulchre. It discolors wood. It effloresces and loses its virtue. It is hygroscopic and destroys paint and varnish. It decays wood inevitably. Its resistant virtue is excellent *while it lasts*, but its endurance against attacking flame is brief. For instance, if we stand vertically a piece of untreated 1-inch white pine before a horizontal Bunsen burner so that the blue-point impinges, the average resistance to penetration and disintegration is thirty-two minutes. Similarly exposed, the average resistance of a piece of 1-inch white pine saturated with sulphate or phosphate of ammonia is sixty-three minutes, or an extension of life, due to the chemical, of thirty-one minutes.

Now, it is an admirable result to secure immunity from fire for thirty-one minutes, if no better result could be attained, and know that woodwork will not spread flame when treated; but it is not commensurate with the cost, and is not much to be proud of. Universally understood, it would not be considered a valuable commercial result.

The effectiveness of ammonia salts to repel flame from a wood surface depends upon the rapid volatilization of the ammoniacal gas. The greater the applied heat, the more rapid the exhaustion of the protective gas, and, when exhausted, no residual inert substance remains to bar the advance of flame or progress of disintegration. The gaseous emission chemicals were the only known materials used, up to five years ago, in any commercial fireproofing plant.

It became necessary to seek for practical materials, operating on a *reverse principle* from the gaseous emission, and after years of laborious effort sulphate of aluminum was discovered to be the substance endowed with the property of fire-resistance inconceivably beyond any previous conception. For instance, the best results from the *gaseous emission* substances was an added life over untreated wood of thirty-one minutes. Now the average of 2,800 pieces of 1-inch white pine treated with sulphate of aluminum has an added life of seven hours and thirty-eight minutes, or over fourteen times that of wood treated with the gaseous emission chemicals.

This most satisfactory result comes from the simple fact that sulphate of aluminum under flame loses its water of crystallization, its sulphuric acid of combination, and remains then *residual pure aluminum* which has the admirable property of expansion in the vacant cells of wood, to two and one-half or three times its original volume of dry sulphate; and in doing so it interposes between flame and wood fiber a compact mass of pure alumina, infusible by the flame of any conflagration, and an admirable non-conductor of heat.

It appears, therefore, that the fire-resistance achieved in saturated wood proceeds from the *massing within it* of an inert and infusible substance, which from its non-conducting character *bars* destructive heat and produces endurance of the mass, and absolutely negation to flame, for a prolonged period of time.

This, as the best result, seems to assure that the *massing principle* is the correct one; and it is further illustrated and confirmed by the extension of it in a wholly different application.

A casual remark was made over two years ago by a prominent insurance man, to the effect that the saturation of wood by sulphate of aluminum was assuredly a great gain to it in fire-resistant quality, but that *he* was quite as much, if not more, interested in the preservation of *existent* structures, from attack by fire, than he was in preparation for protection of non-existent structures, or those only in contemplation; and he counselled the serious study of this phase of wood treatment.

The proposition, in view of the small results accruing from the multitudinous so-called fireproof paints, was by no means an encouraging one; but the powerful results accomplished on the massing principle *in* the cellular structure of wood bodies indicated the direction to be a *massing* of a series of chemical solutions *on* the external faces of wood bodies.

A wholly new set of phenomena appeared for consideration: —

All paints known to the writer, applied to the superficies of wood, on the application of heat break up sooner or later, scale off, or otherwise disappear.

The attachment to the superficial cells of wood seems to be slight, and to effect a *bond* the *penetrative* effect of an initial application should be marked.

A chemical substance was discovered possessed of extraordinary penetrative power, a simple application entering below the surface even of oak one-quarter of an inch.

By subsequent coatings, other chemicals, *making chemical union* with the first, insured adhesion and condensation, and an *enamel, not a paint*, grew upon the wood surface, possessing a fire-resistance over six times, on the average, that of wood treated by sulphate of ammonia solution diffused throughout the entire wood body.

The problem involved the discovery of a *transparent enamel* for hard and fine woods in interior work.

It compelled the discovery of means of application to woods covered with old paints and old varnish; the ability to absorb and receive on its surface lead or zinc paints when required; and it finally led to the discovery of means of incorporation of all shades of coloring in the massed enamel, so incorporated as to be proof against wear of weather exposure, and by such incorporation to preserve indefinitely the original freshness and brightness of the coloring-matter.

The palpable results of this work are before you. The aim has been to honestly and most practically cover the whole ground of wood protection from the attacks of flame and fungus.

It is not for a moment claimed that wood treated by these processes is absolutely impervious to fire; that such wood is irreducible by fire; but it is believed that by these processes and chemical solutions wood has gained a large immunity from attacking flame, and that in each instance it will only disintegrate after the flame has persisted for such a great length of time that ample opportunity will be given for extraneous aid to extinguish it.

In going over the ground of results accomplished in the more effective protection of wood from fire, the vital value seems to be that its treatment produces unquestionable *non-inflammability*. It thus becomes a determined fact that wood thus treated, sustaining no flame itself, can communicate no flame; and attacking flame can endure only so long as its original fuel-supply remains unconsumed. Therefore, a fire originating in untreated contents of a structure will consume such untreated contents, and may blacken and roughen the surfaces of the structural wood, but can never excite any flame thereon if the fire-resistance resulting from treatment is efficacious, and must necessarily be limited to the radial distance of the extension of the projected flame.

These facts are not only proved by minor tests, as those before you, but in case of actual structures of treated and untreated wood of practical dimensions erected for comparative observation.

PRESERVATION OF IRON IN CONCRETE.

IN 1890 there was built in Berlin a revetment-wall consisting of reinforced concrete slabs between I-beam posts resting on piles cut off below low water and held horizontally by back-stays. The piles are survivals of a previous crib. In the spring of 1901 the Department of Public Works undertook a thorough investigation of the condition of the concrete slabs and the iron imbedded in them,

which is reported in a recent issue of the *Zentralblatt der Bauverwaltung.* The reinforcing consists of horizontal ⅜-inch round iron rods, in number depending upon the earth pressure acting on the slabs, and of vertical rods about $\frac{3}{16}$-inch in diameter. The vertical and horizontal rods are tied together by wire so as to form a netting.

To investigate the condition of the slabs and the iron imbedded in them, nine slabs were chosen which showed cracks and other injuries, and twelve slabs which had a perfectly good appearance. Thirty-two holes about 10″ x 10″ were chiselled out, completely uncovering the rods, and at all places also where marked injuries were noticed the concrete was removed completely from the rods. The horizontal rods were .04 inch to .4 inch, and the vertical rods .4 inch to 1 inch from the faces of the slabs. In an injured slab three horizontal and two vertical rods were uncovered. The greater part of the upper horizontal rod was covered by a thin layer of rust, and the mortar, from the rod to the face, was destroyed. The two lower rods were free of rust. The vertical rods were somewhat rusty at several spots. In another injured slab, the uncovered rods, four horizontal and four vertical, were all equally rusty.

In a slab, which appeared on the outside to be in perfectly good condition, three horizontal and four vertical rods were uncovered. The two upper rods were rusted the same as in the slab first mentioned, but the lower rod was free of rust. The four vertical rods showed slight rusting at several spots. In another uninjured slab, all the rods uncovered, four horizontal and three vertical, were found to be free of rust.

In a slab in the upper row, the concrete had scaled off for about 4 inches above the bed-joint, and short distances each side of the post. The uncovered rods were much coated with rust on the face. In another slab the concrete had cracked off near the lower edge for about 4 inches. A horizontal rod laid .2 inch from the face had become loose, and was much rusted on the face. In still another slab, seven horizontal rods became loose because the concrete layer covering them had cracked off. The rods were much rusted. Three other slabs showed the same injuries. The concrete layer, which was only .12 inch thick, had cracked off, and the rods which were laid bare began to rust.

Some conclusions as to the building of reinforced concrete slabs of this type and the arrangement of the imbedded rods may be based on these observations. Rods with incipient rust were found in a relatively great number in injured slabs and in slabs in good condition externally, but destruction of the concrete was found almost invariably only where the rods were near the external face. At such spots, having only a thin protecting layer of cement, it was found that the rod was much rusted on its front only while the rest of the surface remained clean. Apparently the injury to the slabs may have been caused partly by the improper location of the rods, even, when free from rust, and partly by the use of rusted rods. Wherever rods free of rust protected by a good layer of cement of .3 inch to .4 inch and more in thickness were uncovered, the slabs showed no injury. It was also observed that the mortar adhered less strongly to the rusty rods than to the rods free of rust. From the latter the mortar had always to be removed by the point of the hammer.

Since the greatest bending-stresses take place at the middle of the slab, it will be well to bend the rods so that they will be near the centre of thickness at the supports and the requisite distance from the face in the middle. No greater difficulties will be encountered in tamping the concrete than are encountered with straight rods which have to be bent in at the ends because of the flanges of the I-beam post. No accuracy is required for the curve of the bent rod. — *Building News.*

THE GREAT QUESTION OF LEVEES.

THE levee question will come before Congress this winter in a shape it has never assumed before and with a strength heretofore unknown. It is understood that the Mississippi River Commission will lay before Congress a demand for a larger appropriation for levees, if not the assumption by the national Government of complete control over them and responsibility for their construction and maintenance. This demand will be based on the experience of the present year, when the deforestation and drainage of the land in the upper Mississippi Valley, the recklessness of the people, and the carelessness of the Government have resulted in such a flood pouring down the river as to render it impossible for the people living in the alluvial lands along the Mississippi to protect their country from overflow. The further fact that wherever levees have been built of the proper size and strength they have sufficed to keep out the flood fixes the obligation on the Federal Government to assist more generously in the matter, if not to assume full care of and responsibility for the levees.

When the high water in the lower river reached its maximum and crevasses were reported from the St. Francis, Yazoo, and Tensas basins, there was a disposition on part of many Northern papers, ignorant of the real conditions prevailing here, to exaggerate and to see in the few crevasses that occurred a general failure of the levees. So eager were some of the Northern papers for sensations that they had even Memphis under water, although it is on a bluff, and New Orleans flooded, in spite of its complete escape; and it required some effort on our part to disabuse them of their wild and absurd ideas.

It is well, then, that they should be given all the facts in regard to levees to show how well they stood the flood and what a protection they have proved. There were some crevasses, it is true, seven in all, in Louisiana, Mississippi and Arkansas, but in all cases these breaks were due to the fact that, because of insufficient provision by the Federal Government, it was not possible to build these levees of sufficient height or strength. Mr. Charles Scott, of the Mississippi River Improvement and Levee Association, has given to the Memphis *News* some interesting information on the lesson of the flood and levees.

Mr. Scott considers that the late flood in the lower Mississippi teaches us two lessons: —

(1) The necessity of controlling the Mississippi River in the interest of the riparian owners and of the country at large; and

(2) That it can be perfectly and permanently controlled by a massive system of dikes properly constructed.

Reviewing the history of the Mississippi River, he shows the origin of levees and the good work done by them in redeeming the overflowed land and bringing it under cultivation; and he points out the utter failure of the other schemes for protecting the alluvial lands from overflow.

Any point that might be made because of crevasses here and there he disposes of with the following figures, showing how great the improvement that has occurred since we have built higher and stronger levees: —

Number crevasses in 1882	282
Number crevasses in 1897	38
Number crevasses in 1903	7
Number miles of levee destroyed in 1882	54
Number miles of leven destroyed in 1897	8.7
Number miles of levee destroyed in 1903	2 5

Out of 1,400 miles, which constituted the entire levee system.
Proportion of alluvial lands inundated: —
In 1882, practically the whole, 100 per cent.
In 1897, 33 per cent of the whole.
In 1903, 16 per cent of the whole. (Very little under cultivation.)

It should be remembered finally that the high water of 1903 greatly exceeded that of either of the two years with which comparison was made. That these lands are worth the cost of protection from overflow he proves by the following figures he gives of the work of land reclamation in Holland: —

Number of acres of area in the entire Netherlands in 1833 was 5,611,860.

Area in 1877 increased to 8,148,020 acres.

Increase in area and amount of land rescued by dikes from inundation, 2,536,160 acres.

Cost of building the dikes, $61,000,000.

Value of land as reclaimed, figuring at an average of $500 per acre, $12,680,180,000.

Gain to the Netherlands by the reclamation, $12,619,180,000.

The Holland lands reclaimed from the ocean will not compare with the alluvial lands of the Mississippi that will be protected from overflow and rendered cultivable by the erection of levees of the proper size. When their value is considered, when the responsibility of the Federal Government in the matter is demonstrated, we do not see how Congress will be able to refuse the demand that should be made on it this fall and vigorously pressed and insisted on. The Mississippi is a national river; its floods are caused by conditions existing outside of the lower alluvial States, over which these States have no control, whereas the Federal Government has. If it had exerted itself in the matter years ago, if it had protected the forests at the headwaters of the Mississippi and its tributaries from destruction, improved the condition of the river, deepened its channel and strengthened its banks as the settlement of the valley lands went on and the volume of water poured down on the States below increased, we would not now be facing the dangers of high water. This neglect of the past must be made good now by the Federal Government assuring us levees high enough and strong enough to keep out the flood. — *New Orleans Times-Democrat.*

BOOKS PAPERS

IT is not easy to offer anything but favorable criticism of Guy's notable work on the flexure of beams. This book[1] is a reprint of a series of articles which appeared in the *American Machinist.* The scope of the work is indicated in the preface by the statement that "The study of the failure of beams by the buckling of the compression side has been strangely neglected, and now that it has been taken up, it proves to be the central fact and key to the entire subject when looked at in the broadest sense. The analogy of the failure of the compression-side of a beam by buckling to the method of failure of a long column was, of course, long ago remarked, but we believe there has been no previous attempt, certainly no successful attempt, to connect the two by a formula."

Every constructor has at times felt the inadequacy of existing formulas to determine correctly the proportions of a beam, taking

[1] "*Experiments on the Flexure of Beams,*" Resulting in the Discovery of New Laws of Failure by Buckling. By Albert E. Guy. New York: D. Van Nostrand Company. 1903. Price $1.25 net.

into account its liability to fail by buckling. Mr. Guy's work is purely analytical in its presentation, but the analysis is based so entirely upon the most careful, exact experiments and the resulting formulas are put in such usable, practical shape that the deductions have a value far in excess of what is usually expected of analytical research. Guy claims to have "solved experimentally the question of the lateral collapse of the beam and excavated the sectional area from good experience sanctioned by practice." It is so rarely that an investigator of this sort is willing to consider that his formulas are for use quite as much as for intellectual diversion that the writer certainly deserves more than the ordinary meed of praise. He has formulated the results of his experiments and analysis in three laws which deserve to be identified by his name, and which in some respects constitute the most remarkable addition to our knowledge upon the subject which has been contributed within several generations. These laws are as follows: —

First Law. — The load causing the buckling of a beam through flexure is inversely proportional to the square of the length upon which it acts directly.

Second Law. — The load is directly proportional to the cube of the thickness and to the depth of the solid or, generally, directly proportional to the moment-of-inertia of the section of the beam considered, taken in reference to an axis passing through the centre-of-gravity of the section, parallel to the direction of the load.

Third Law. — The total effect of one or several forces or of their components is equal to the algebraic sum of their individual effects.

The book, however, does not stop with merely determining the laws. It makes practical application to a simple beam, and shows how to calculate all the parts with an exactitude not possible under any other existing formulas. We do not agree personally with all the writer's statements. He seems to consider a factor-of-safety of two as ample in figuring the resistance to buckling. Furthermore, all his experiments were made upon small units, and in defence thereof, or, as he puts it, to strengthen the confidence of readers, he states that the science of the resistance of material owes more to laboratory experiments on small scale than to those made on large specimens. We should distinctly not agree with this. Nor can we quite appreciate why, with so keen an analysis as he has undertaken, he should be satisfied to assume that in a beam with any symmetrical cross-section the neutral axis is necessarily exactly midway of the height. But, aside from a few slight objections of this nature, the book is unreservedly deserving of the highest praise and it marks a distinct epoch in the development of structural science.

MOST architects and draughtsmen occasionally need to determine the strains in a truss, or an arch, or an unequally loaded beam, and, for that purpose, often wish to refresh their memories from some text-book of statics. The science of statics has advanced materially within a few years, and the notation, particularly in the graphical branch, has been made clearer; so that a modern text-book is always to be preferred for reference, even for those who have been familiar with the older ones. In Professor Johnson's book,[1] while the graphical system is explained very clearly, it is treated in a novel way, as coördinate at every step with the analytic, or, as Professor Johnson prefers to call it, the algebraic method. There can be no doubt of the advantage to students of this treatment, which, by taking up every problem both graphically and algebraically, and showing the practical identity of the two methods in all cases, greatly facilitates the understanding of both. It may be imagined that a student accustomed to making graphical diagrams of statical problems will rarely be at a loss for the proper equation if an analytical solution is required; and, on the other hand, an occasional algebraic treatment helps in giving clearness of conception of problems, and preventing the graphical method from sinking into the rule-of-thumb matter which it often becomes with students. This is, perhaps, the most valuable feature of the book for architects. As drawing is easy for them, and they have the materials always at hand, they, as a rule, always use graphical methods for calculating frames of any kind, reserving algebraic solutions for problems of loaded beams, or cantilevers, where there are no trigonometric functions to be looked up in the book of tables; but, as every architect knows, there are a good many trusses, particularly of the ornamental sort, which present members of very uncertain structural quality. Sometimes the stress diagram for the joint including them closes without them; and it occasionally happens that the direction of the stress in them is not easily determined. In such cases the clearness of mental vision cultivated by a moderate practice of analytical methods is very useful; while, in problems which would, in general, be treated graphically, certain elements, as the reactions of the supports under unequal loading, or under wind-pressure, are more quickly and accurately calculated algebraically than graphically.

GERMAN VANDALISM AT ATHENS. — Athenian newspapers denounce a party of four German vandals who got access to the Acropolis and in an unguarded moment forthwith proceeded to chip off parts of the invaluable sculptures. — *Exchange.*

[1] "*Statics*," by Algebraic and Graphic Methods; intended primarily for Students of Engineering and Architecture. By Lewis J. Johnson, C. E., Assistant Professor of Civil Engineering in Harvard University. New York: John Wiley & Sons. 1903. Price $2.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE CREDIT FONCIER EGYPTIEN, CAIRO, EGYPT. SIG. CARLO PRAMPOLINI, ARCHITECT, CAIRO, EGYPT.

THE Credit Foncier Egyptien, desiring to have a new building for the installation of its several services, so as to respond to its present actual needs, decided to open a competition for the construction of a building satisfying every possible condition of security. Architects of every nationality were allowed to take part in this competition. The total cost of the building was not to exceed the sum of £25,000 Egyptian; that is to say, $130,000. Two prizes were established for the authors of the best two schemes — the first prize of 6.500 francs, and the second prize of 2,600. In the month of December last, a committee of architects of every nationality examined and reported upon the 200 designs submitted. The first prize was awarded by unanimous vote to the design marked *Comme un rêve*, by the architect Carlo Prampolini, of the Ministry of Public Works at Cairo. This design was found by the committee to be the most noteworthy and best studied of all the designs in the matter of the arrangement of the different services and in point-of-view of providing security.

The building designed by Signor Prampolini occupies an area of 1,989 square metres, and consists of a basement, ground-floor and first story. The principal façade is 55 metres long, and the total height of the building is 21.85 metres. In the basement are the strong-rooms, closed with shutters, and the offices of the accountants and the secretarial force. Especial care has been given to protecting all the rooms of the basement, not only against fire, but also against dampness and burglars.

Upon the ground-floor is the main vestibule, with two halls opening from it, giving access to the grand counting-room, of rectangular form, with an area of 108 square metres, very well lighted. The cashier's department, which occupies 115 square metres, is very favorably arranged after the manner in common use both in Europe and in America. This also provides for the service of loans and discounts.

In the upper story is the hall of the directorate, the apartment of the administrative chief and divers financial departments. The staircase which leads from the ground to the first floor is richly and artistically decorated, as is also the counting-room, in a manner entirely appropriate and in good taste. The same thing may be said of the directors' room.

The façade sufficiently declares the character of the structure as a public building.

COUNTING-ROOM DETAIL: CREDIT FONCIER EGYPTIEN, CAIRO, EGYPT. SIG. CARLO PRAMPOLINI, ARCHITECT, CAIRO, EGYPT.

THE BOURROUGHS HOME FOR OLD WOMEN, BRIDGEPORT, CONN. MR. J. W. NORTHROP, ARCHITECT, BRIDGEPORT, CONN.

CANDELABRUM. DRAWN BY MR. W. L. WELTON, LATE HOLDER OF THE ROTCH TRAVELLING-SCHOLARSHIP.

Additional Illustrations in the International Edition.

DOME OF THE RHODE ISLAND STATE CAPITOL, PROVIDENCE, R. I. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

THE ROYAL TOWN PALACE, POTSDAM, PRUSSIA.

WOODEN CEILINGS: IN THE REGGIA DEI GONZAGA, MANTUA, ITALY. — IN THE BADIA, ITALY.

THE NEW BANQUETING HALL, MANNHEIM, BADEN. BRUNO SCHMITZ, ARCHITECT.

THE BEETHOVEN DOOR: NEW BANQUETING HALL, MANNHEIM, BADEN. BRUNO SCHMITZ, ARCHITECT.

NOTES & CLIPPINGS

A GREAT WHEEL-PIT AT NIAGARA. — The Toronto and Niagara Power Company is to build a power wheel-pit at Niagara Falls 480 feet long, 180 feet deep and 27 feet wide, cut through the solid rock. The work will cost $1,250,000 and will develop 225,000 horse-power. — *Exchange.*

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[ROM]AN FRESCOS. — Among the Roman frescos from Bosco Reale [found] recently in Paris one finds wall-spaces painted to represent an outlook on garden or town, as if the wall were absent and large windows unincumbered by screen or grating were framed by pillars having golden capitals. In one case the view embraces a front door, flanked by a tall jardinière with growing plants on the left, and a pillar crowned by a draped female figure in bronze on the right. Over the door is a device like a balcony and above the balcony come the eaves of the house. On the wall to the left is a window of wood with four colonnettes making three openings, the whole window frame applied to the wall in the fashion still to be seen in Egypt and Turkey. The most curious thing in this perspective of a town is the group of tall buildings which show above the roof of the house. There are tall square towers with loggias above, like the belfry story of Italian campaniles. Directly out from a high wall springs a square chamber with broad windows on opposite sides, apparently a lofty loggia to catch the wind. While to a certain degree fantastic in the close clustering of the towers and high walls, this glimpse of a Roman townscape is of great use to architects who are trying to reconstruct old buildings from the ruins left by the ages. Another wall gives glimpses into a square surrounded by a portico of large columns, in the centre of which rises one of those round, pillared, slender monuments like that of Lysicrates which survives in Athens. It has a sharply pointed conical roof ending in a graceful finial. The painted gardens show arbors with vines running over the trellis, terraces topped by balustrades, bold rockwork which is artificial and marble benches such as are found in Pompeii. These frescos retain much of their original colors and indicate a very powerful color-sense in the artisans who composed them, and even a good understanding how to reproduce sunlight and out-of-doors effects. The features of the women are strongly marked, very earnest, even determined in expression, and resemble certain Greek types more than they do the living types about the Bay of Naples. — *N. Y. Times.*

CHICAGO SORRY FOR HER NOISE. — That Chicago is in earnest in her anti-noise crusade is shown by the preparation of plans to lay the rails of its elevated railway system in a bed of hard rubber. The expense is figured at $2,000,000, but hang the expense if you can enable one Chicagoan to talk to another downtown without bursting a blood-vessel. As for visitors, they break and run for the lake-front when they feel the necessity of conversing together. A few more years of the present indescribable uproar in Chicago and the people there will do nothing but make signs. As it is now, you see thousands of them walking along talking to themselves as if they had just escaped from an asylum for the insane. It is the only way they can think. Without uttering their thoughts it is actually impossible to make themselves comprehend what their own minds are busying themselves about. Chicago used to be proud of this noise. She felt that it impressed strangers with the bigness of Chicago, and at one time if the volume of sound could have been punctured with minute guns of dynamite it would have completely expressed the Chicago spirit. The idea was that no one should be allowed to go to sleep, and that everybody was to "holler," as the ringmaster and the roustabouts at the circus do when the bareback rider is doing his grand jumping on and off finale. The noise made the bricklayers lay brick faster, the pavers hasten with their concrete hoes, the sewer diggers' spades flew the more rapidly, the flying multitudes on the sidewalk broke into a run, and every human activity was spurred up at least fifty per cent. But Chicago is tired of all this now. She has stopped long enough to ask the purpose of it all; and, since she has now taken the other chute, the chances are that, with the usual Chicago energy applied to it, she will become so noiseless that you can hear the rustle of a newspaper the man is unfolding in the next block. — *St. Louis Globe-Democrat.*

A FINE QUEENSLAND TREE. — The silky oak (*Grevillea robusta*), one of the most valued trees for timber purposes in North Queensland, is spreading in many parts of the world, especially in Ceylon. It is very hardy and drought-resisting, and flourishes quite well at sea-level and 6,000 feet above. The tree enjoys popularity and wide diffusion on account of its vitality, beauty of foliage, and value of timber. Its favorite habitat are the scrubs that lie back from the northern coasts of Queensland. The silky oak exudes both a gum and a resin. As to its vernacular name, Hooker says: "From its deeply dissected foliage and the silkiness of its underside, it has obtained the name of 'silk oak' among the pine cutters on Moreton Bay (Queensland)." When split on the quarter, this timber shows a handsome oak-line grain, the prefix silky being either because of the silky underside of the leaf, or on account of the bright appearance of the freshly-split wood. The Queensland aborigines call the tree "Koomkabang." The tree bears a profusion of orange-yellow flowers, which, like those of most members of the natural order to which it belongs, are rich in honey, and hence are sought after by the bees. The chief characteristic of the timber is its fissility. It is light in color, and has a handsome oak-like figure. It is moderately hard, and works well. Two well-seasoned slabs of this wood have weights which correspond to 38 lb. 14 oz. and 36 lb. 2 oz. respectively per cubic foot. — *Building News.*

DISCOVERY OF STOLEN TAPESTRIES. — The Paris police discovered by accident when making a visit to the apartment of a certain Mme. Berthon, accused of some minor offence, one of the superb Aubusson tapestries recently stolen from the cathedral of Tours. The priceless piece representing the adoration of the Magi, was used by the woman as a portière. Two of the other tapestries stolen at the same time were found in the apartment cut to pieces. The police have been unable to discover as yet how they were stolen. — *N. Y. Evening Post.*

PARIS HOUSE STATISTICS. — Of the 79,742 houses in Paris, 47,716 may be regarded, says *Le Journal* of Paris, as very good, or good from a hygienic standpoint, and 32,026 as indifferent or defective. Out of the above total 59,959 are provided with spring water, and 11,050 with both spring and river water; while 23,252 have modern sanitary arrangements. Lightning is effected by electricity in 4,651, by gas in 57,740, and by oil or petroleum in 17,351. The number of Paris houses entirely warmed by calorifères is 6,017, and of those provided with lifts 2,224.

MCCLELLAN MODELS REJECTED. — At a meeting of the McClellan Statue Commission in Washington on June 17, the following resolution was adopted unanimously: —

"*Resolved*, That, inasmuch as it appears by the final letter of advice from the advisory committee, consisting of Messrs. Saint-Gaudens, French and McKim, that no model submitted upon the competition is satisfactory, the commission exercises the right reserved in the programme of competition, and rejects all the designs and models submitted."

It was stated that the commission will invite some sculptor who was not in competition to submit a design or model of a statue to McClellan instead of again calling for designs in competition. — *Exchange.*

TREASURE-TROVE AND THE BRITISH MUSEUM. — Buyers of antiques or objects of art or archæology often enter, with the best of intentions, into transactions which appear simple enough at first sight, but which later develop surprising complexities. The collector, individual or corporation, frequently purchases on the understanding that the seller is without reservation the owner. Subsequently it transpires that some one else has claims, that there is a lawsuit involved, or Government claims the right to preëmpt, or the object turns out to be treasure-trove. The last has just occurred in England. The British Museum had bought from an Irish collector (who was a member of the Royal Irish Academy) a collection of Celtic antiques. These the Irishman had bought from a Belfast jeweller, and he, in his turn, from the peasant who had found them. The jewels were safely installed in the British Museum, when, after waiting eighteen months, the Royal Irish Academy came forward with the claim that these articles were treasure-trove, and, therefore, appertained to the Crown. The claim added that, according to the practice of the Home Office, Ireland should have the right of preëmption. After lengthy litigation, the courts have sustained the first claim, and the property reverts to the Crown. Whether the Royal Irish Academy will now gain possession of it remains to be seen, as the matter is at the disposal of King Edward. Of course, the Treasury will see to it that the British Museum trustees get back the £600 which they paid "very properly in the discharge of their duty," as the Attorney-General commented. But every collector who tries to involve himself in a similar tangle does not come out so easily. — *N. Y. Evening Post.*

A NEW FORM OF AUTOMATIC SPRINKLER. — One of the most objectionable features of the automatic sprinklers now so often fitted in factories and warehouses, and other large buildings, is the serious damage by water, which frequently takes place by the unnecessary flooding of a comparatively large area for the purpose of quenching a fire which may be confined to a few feet of floor-space. It has frequently happened that where the fire has broken out and been extinguished without discovery, the sprinklers remain in action for hours afterwards, and the water has done as much damage as a serious fire. Mr. George C. Hale, till recently chief of the fire-department of Kansas City, has devised an apparatus which combines some of the characteristics of the sprinkler system with that of the Babcock tank extinguisher. The pipes, instead of being filled with water, contain air under pressure. The unusual heat causes the breaking of a seal, as in the case of the sprinklers, and this release of air automatically performs the operations of generating the gas, which thereupon issues from the pipes and extinguishes the fire by smothering it. There is a small amount of water in the tank, which is necessary to create the required pressure of gas, and some of this issues through the pipes, but it would not in most cases be enough to cause any material damage. — *Building News.*

TO RAZE EXPENSIVE BUILDINGS. — Because inferior mortar was used in the construction of two big buildings at the Government Powder Works, Picatinny, they are to be torn down and others erected. The buildings are of brick, and were built at an expense of $15,000, a New York firm having the work. When the Inspector from Washington went through the works lately he discovered that mortar had been used which was not up to the grade specified in the contract, and he immediately ordered the destruction of the buildings.— *N. Y. Times.*

WORLD'S FAIR EXPENDITURE. — The World's Fair Company has expended in actual cash $8,500,000 up to the first of the present month, as shown by the report of the Auditing Committee of the National Committee at work here. The Commission has been informally notified by the Exposition Company that a request will be made upon the Secretary of the United States Treasury to be allowed to draw on the fund of $5,000,000, appropriated by the Commission for the Fair, between now and September, probably in August. Contracts have been let by the Exposition Company that will approximately complete the expenditure of the $10,000,000 required by the Act of Congress before any of the Government funds are available. The report of the Auditing Committee will be forwarded to Washington, and when the Government fund is available the money will be paid out under rules and regulations prescribed by the Secretary of the Treasury. — *Exchange.*

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The American Architect.
July 18, 1903.
No. 1438.

THE GARDEN FRONT: HOUSE OF ANDREW CARNEGIE, ESQ., FIFTH AVE., NEW YORK, N. Y.
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THE GARDEN.

THE PERGOLA.

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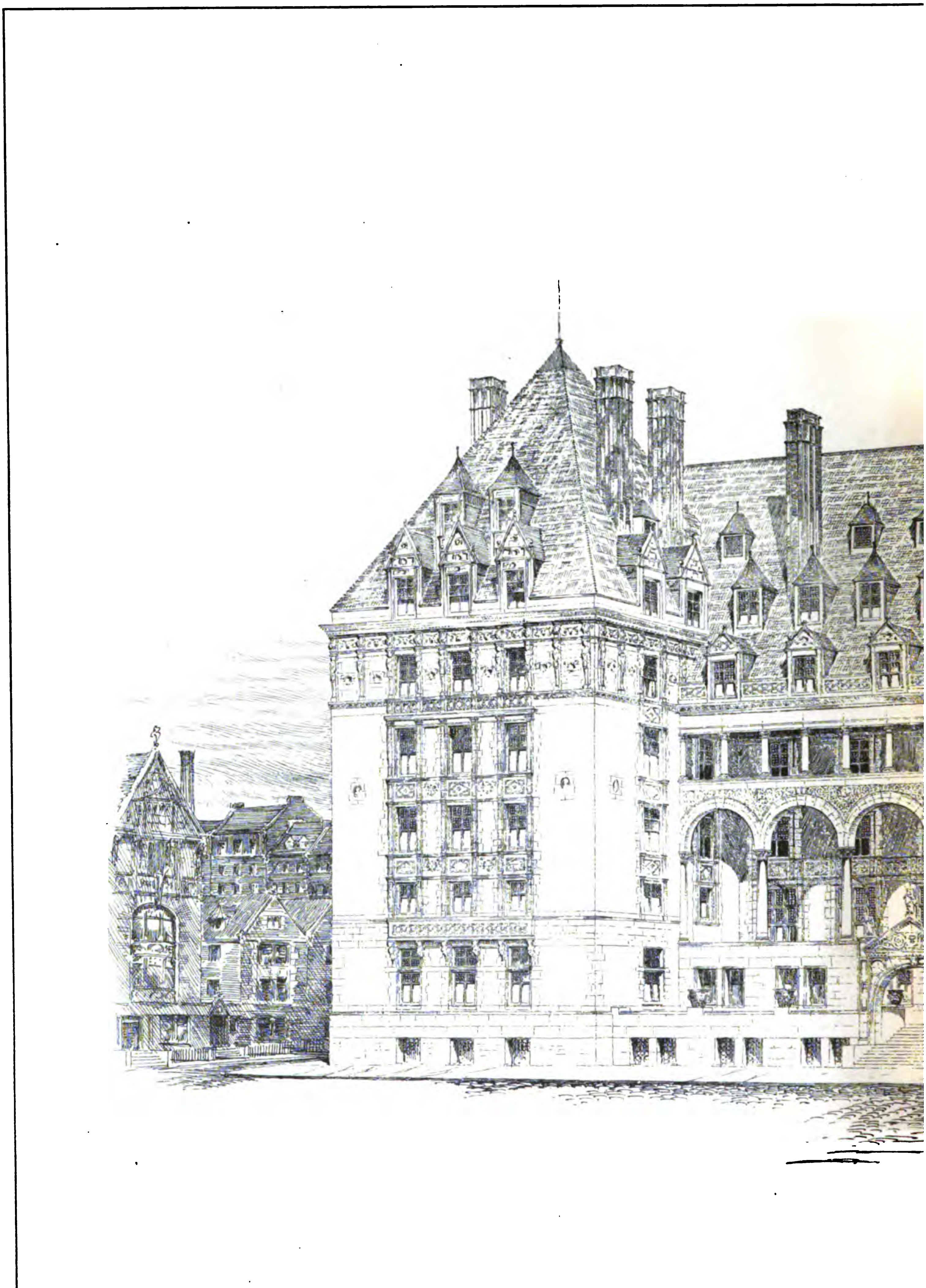

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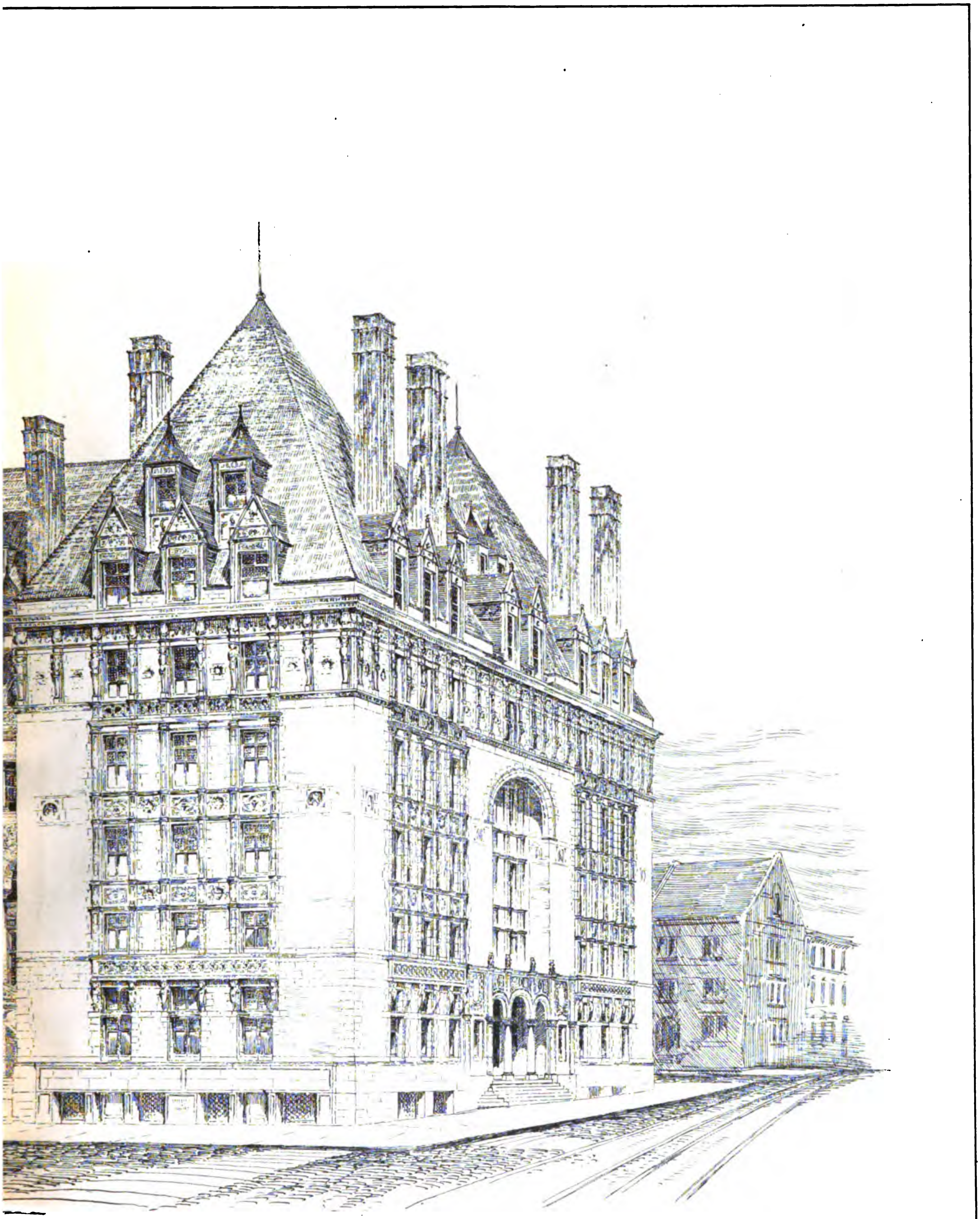

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THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI SATURDAY, JULY 18, 1903 No. 1438

CONTENTS.

THE contest between the Association of Building Employers in New York and the unions has terminated, the unions voting, one by one, to accept the plan of arbitration offered by the Employers' Association, with certain modifications, unanimously agreed to by the representatives of both sides. The Painters' Union, which has been one of the worst sufferers from the ambitious scheming of the walking-delegates, was the first to declare its independence of them, and accept the Employers' plan; but the others followed in rapid succession, and building work is already actively resumed. On the whole, the result is a victory, not so much for the Employers' Association as for justice and common-sense, of which the Association was, to a great extent, the representative. Under the new agreement, the present schedules of wages are to remain in force for a year, so that both masters and men know what to count upon for twelve months, to the great advantage of both sides; and, for the future, it is agreed by both sides that no walking-delegates or "business agents" shall be appointed to represent the men, or shall be received by the employers. The present walking-delegates make a show of submission to this stipulation, but it is a characteristic of their tribe to "lie low" in adversity, only to make their appearance again when the public attention is diverted from them, and we shall not be surprised to see them, a year or two hence, filling their pockets, and gathering political plums, as actively as ever, although, probably, under a different name.

SO far as the employers are concerned, the settlement will undoubtedly be of great benefit, not so much in the direct saving of money, since wages will remain the same, as in affording a reliable standard for making contracts, and in giving a reasonable hope that a contract can be carried out within a definite time, and under definite conditions. Within the last few years, a building contractor in New York has been in constant danger of having his undertakings interfered with by malicious conspirators, against whom he had no redress. It is this burden which the Employers' Association determined to remove, and it has succeeded, more quickly and thoroughly than any one anticipated, in accomplishing this result. Very probably it may have to deal with the same trouble again later, but it has learned the lesson that organization can be met by organization; and, so long as it maintains the attitude of fairness and consideration which has characterized it so far, it has little to fear.

AN interesting dispute is going on in New York between Mr. Lindenthal, the Commissioner of Bridges, and certain other engineers of note, in regard to the new suspension bridge over the East River. Mr. Lindenthal prefers to use eye bar cables for the suspending members of the bridge; while several eminent engineers object to these, and advocate wire cables, as being less expensive, and more reliable. Naturally, we do not venture to express an opinion on such a delicate point; but the fact that every portion of an eye-bar cable is exposed to view, while the interior of a wire cable can never be examined, will be, to the mind of an architect, an advantage to the former. It is fair to say that Mr. Lindenthal's plan has been approved by a commission of experts, appointed by the Mayor, so that it is likely to be carried out, notwithstanding the conflicting opinion of others; but it would be interesting and instructive to have the two sides of the question thoroughly discussed, with the support of all the available evidence on each side.

IT is reported that, whenever the plans for the Manhattan Bridge are finally decided upon, several foreign firms, including the Krupp-Gruson Company, will submit bids for carrying them out. This prospect seems to alarm some of the New York people, who think that American firms ought to be protected against the competition of foreigners. Of course, if the people of New York like to pay high prices to monopolies, that is their concern, but it may be observed that the notion that the exclusion of foreign bidding necessarily involves advantage to American citizens is a delusion. Although, in many industries, our highly-paid workmen, through their superior intelligence, produce goods at a smaller labor cost than the careless and unambitious foreign workmen, there are others, particularly those employing unskilled help, in which the scientific training of the German engineers and superintendents gives them an advantage over us. In these industries the radical step has been taken, in multitudes of cases, of transferring the industry bodily to our territory; and we imagine that the statistics of manufactures carried on in the United States by foreign capitalists, with foreign superintendents, imported machinery and foreign workmen, would surprise the public. Of course, we are very far from deprecating this movement, which has done a great deal for the prosperity, as well as for the intellectual development, of the country, but it may be useful for over-zealous protectionists to remember that the policy of shutting out, by means of the custom-house, occasional shipments of goods from a foreign manufacturer, has brought the foreign manufacturer, with bag and baggage, over here to compete, often with overwhelming success, against the Americans in their own market.

ARCHITECTURAL tourists and students will be glad to know of a new arrangement, entered into, under a common agreement, by the seven "great railroad systems" of France, under which personal baggage is received at any station, and sent to any other station, there to await its owner, who is not obliged to travel on the train with it, or on any train, but may proceed from the place where his baggage is received to that at which it is kept for him in such way as he may prefer, either through the air, in a balloon, or on foot, or in an automobile, or on a bicycle. An experimental trial of this system was made two years ago, and has proved so successful that it is now permanently adopted. Architects, particularly, are likely to make much use of it. To say nothing of the comfort of being able to send one's trunks ahead, and to follow them at a more leisurely pace, with a hand-bag, and a stop-over ticket, the pedestrian sketcher, who, after all, enjoys a tour better than any one else, can go on by easy stages, arranging, if he wishes, to find his baggage awaiting him every night, at the end of a moderate walk through the incomparable picturesqueness and interest of Normandy, Picardy, Burgundy or the Isle of France. Naturally, a charge is made for forwarding baggage in this way, but, in return, the railway company assumes responsibility for its safety, and keeps it until its owner wants it.

THE decision in the competition for the Liverpool Cathedral, which has ended in the employment of Messrs. G. F. Bodley and G. Gilbert Scott as joint architects of the new building, gives much dissatisfaction in England. The two architects selected are well known as masters of the regular English Gothic, and it may be said, in defence of the Cathedral Committee, that a warning, which no experienced architect could mistake, was given at the outset that no other style would be acceptable. Of course, the warning was disguised under a stipulation that the style should be such as to "inspire reverential feelings"; but the meaning of this, in connection with a

Church of England cathedral, was obvious; and the people who, like Professor Beresford Pite, chose to send Byzantine designs, clever as they might be, and as Professor Pite's unquestionably was, could hardly blame any one but themselves for the neglect with which they were treated.

MR. SCOTT'S design, as may be supposed, was correct and well-composed, and Mr. Bodley, who, besides being an experienced church architect, and an enthusiastic churchman, is an artist of great and original talent, may probably be depended upon to illuminate with the "divine spark" of genius the correctness of his younger colleague. There has been no important Gothic building in England since Mr. Pearson's Truro Cathedral, and we are inclined to think that the more vigorous talent of Messrs. Bodley and Scott may produce a work of the highest interest. Meanwhile, a very important piece of Gothic architecture has been begun in this country, in the new buildings for the Military Academy, at West Point, by Messrs. Cram, Goodhue & Ferguson, who have frankly adopted the *parti* of a complete but varied group of buildings, all in a consistent Gothic style. Those who know the work of these artists from our pages of illustrations do not need to be told of the brilliancy with which they use their favorite style, or of their talent in contrasting wall-surfaces with openings; and in the West Point group they have an admirable field for the display of their skill.

THE proceedings of the Boston Park Commission are always interesting, not only because the Boston chain of parks is different from any other in the world, but because there is no place in which so many original ideas in park management have been carried out. The latest of these ideas seems to be one for preventing the disfigurement caused by the display of posters and other advertisements in and about the parks, and is embodied in an order, providing that "No person shall erect on land abutting on any parkway or boundary road of any park, or upon a public way connecting therewith," within the distance of five hundred feet from the park to which their jurisdiction is by law extended, "any fence more than six feet in height, or constructed otherwise than of stone, metal or ornamental work, or of palings separated by spaces not less than one inch in width"; nor is any "sign, poster or advertisement" except signs not larger than three feet by four, and relating only to the selling or letting of the premises on which the sign is placed, and signs not exceeding fifteen inches in width, relating to business conducted on the premises, to be displayed on any land within the Commissioners' jurisdiction.

THIS is certainly radical enough, and the new regulation is likely to do much to preserve the beauty of the ten-mile chain of narrow parks which, except for it, would sorely tempt the bill-board man; but it will interest a good many people to know whether it is retroactive, as a variety of signs, as well as fences, already exist within the Commissioners' limits which are contrary to it. To take an example very familiar to the public, the garden walls of the Gardner Museum, familiarly known as the Palace, are much more than six feet high, and are neither of "palings, stone, metal or ornamental work," unless the bits of sculpture set in the brick walling constitute it "ornamental work." Presumably, the intention of this part of the rule is to keep not only the parks, but the estates bordering them, as open as possible, so as to prevent unnecessary obstruction of air and sunshine, and the object is a very worthy one. The Trustees of the Museum of Fine Arts, or the Simmons College, or the owners of private houses near the parks, are quite likely to be tempted to shut out the gaze of the public by high brick walls, bordering on the park, after the English fashion. This would not only shade the parkways, making them cold and dismal, but would subtract very much from the effect of openness and verdure which it is so desirable to retain; and the Commission has done well to forestall any fashions of this sort.

THERE is a mystery about the closing of the New York State School of Forestry which the public would be glad to have cleared up. Although no one can doubt Governor Odell's impartiality, it seems evident that the personal feeling of some one against Dr. Fernow has had much to do with the movement for the suppression of the School; and architects, who know Dr. Fernow only as the author of reports on the forest timbers of the United States which have been of great value to the profession, and the apostle, we might almost say, of the movement for forest preservation which promises so much for the future of the country, cannot, without regret, either see him, by implication, discredited, or his great work interrupted. Some of the newspapers have attempted to spread the idea that his work in the Adirondack forests has been unskilfully done; but, apart from the improbability that so accomplished an expert, after years of study of American conditions, would show either carelessness or want of knowledge in the treatment of the model forest under his own care, to say nothing of the smallness of the number of newspaper writers in this country competent to criticise his methods, we have the unqualified assertion of Mr. H. B. Ayres, recently Forester to the United States Geological Survey, that the New York State School, under Dr. Fernow's care, is "by far the best forest school on the continent, and in a fair way to be the best in the world." Mr. Ayres adds that, as he has been approached in person by the adversaries of Dr. Fernow, he is in a position to know something of their state of mind, which he characterizes as "thoroughly disgusting"; and he calls upon people who care for the best interests of the forests, and of the State of New York, to visit the School, and investigate the matter for themselves. Meanwhile, it may be observed that the State of New York is much less vitally concerned in forestry than many others, and that, if Dr. Fernow could be induced to do for Maine, or New Hampshire, or Michigan, or Wisconsin, or even the great State of Texas, what he has tried to do in New York, he could accomplish quite as much good, and would, in all probability, be far less interfered with, than in the Adirondack region, where as is currently reported, his chief enemies are found among the cockney sportsmen who swarm there, and whose preferences are quite incompatible with rational forest management.

AS our readers know, the Champ de Mars, in Paris, is to be in part utilized for building. The plans for the new distribution are now under consideration, and the discussion upon them has a certain interest for us. The plan prepared by M. Bouvard, the official architect, recommended to the Municipal Council for adoption by the Prefectoral Administration, and approved by a Committee of the Council, proposes to leave the centre of the space entirely clear, but to reserve for buildings two strips, each about four hundred and twenty-five feet wide, running at right angles with the river, one on each side of the present park. This will leave the greater part of the front of the Military School exposed, facing on the portion of the park remaining between the new blocks. Each of the strips at the sides is divided into two sections, separated by a street running parallel with their length. The houses in the first section, bordering on the park, are to be allowed to be carried to the maximum Parisian height of ninety feet, while those in the sections behind them are restricted to a less height. Besides the main longitudinal streets, the new blocks are divided by cross-streets, presumably in continuation of those which now terminate at the park. The central area, if the vote of the Committee of the Municipal Council is confirmed, is to be devoted entirely to flower-beds and shrubbery, the committee proposing that "in no case, or under any pretext, shall any permanent construction be established in the central portion."

THIS scheme is a great improvement upon any of those formerly considered, under which the Champ de Mars was to be devoted to race-tracks for automobiles, bicycle-tracks, concert-halls and other things of the same sort; and M. Bouvard seems to have utilized the experience which he gained in laying out the Exposition groups of 1900 to good purpose. It is worth noting that, in arranging for limiting the height of buildings, he places the highest buildings in what would seem to be logically the best place for them, bordering on the open area of the park; while the next row is kept lower, partly, as we may suppose, to prevent shading the rear of the lofty houses facing on the park, and partly to give better light and air to the avenues behind them. This is in direct contradiction to the Boston theory, which keeps buildings bordering on parks a quarter of a mile wide very low, while it permits those fronting on narrow streets behind them to be carried up to a height unknown in Paris, and our descendants will have an opportunity of judging for themselves which produces the more successful results.

TESTING THE SOUNDNESS OF CEMENT.[1]

BY the soundness of cement is meant its property to withstand swelling or disintegration after it is once set. The tests for soundness, while exceedingly simple so that they can be made without expert knowledge, are really as important as any to which a cement should be subjected. More stress is often laid in specifications upon the tensile strength than upon other characteristics, but in almost all works where mortar and concrete are used, there is so large a factor-of-safety that slight deficiency in the strength of a cement will not affect the masonry, provided it sets up properly and maintains its volume without expansion or disintegration.

Disintegration of work in cement where it has been mixed with good materials and properly laid is generally due to an excess of lime or of magnesia, occurring in forms which can be attacked by the elements. Freshly ground Portland-cement which has not been given sufficient time to properly "air-slake" may contain free lime which will swell upon the addition of water. This is readily understood from the action of ordinary quicklime as it is used in lime mortar. Quicklime, as is well known, swells to about two and one-half times its original volume when mixed with water into a paste. In a similar way an excess of free lime in Portland-cement may expand and cause the disintegration or distortion of the mortar or concrete in which it is used. If cement containing free lime is exposed to the air before using, it may be air-slaked so as to render it harmless. The presence of free lime is always due to faults in manufacture. The raw materials may be improperly proportioned so that there is too much lime, the mixture may be imperfect, or it may be underburned.

The presence of magnesia in Portland-cement up to three per cent is regarded as harmless, and some of the latest authorities, including the Committee of the American Society of Civil Engineers, suggest a limit as high as five per cent. The presence of a large amount of magnesia in natural-cement — in the term natural-cement being included the Rosendale, Utica, Akron, James River and other cements made from natural rocks by heating them to a temperature less than "incipient fusion" — may not render it unfit for use because of the lower temperature of burning employed in its manufacture.

The test for soundness which has been generally adopted consists simply of making a little pat of the cement to be tested, and exposing it to conditions which will show up its bad qualities. The Committee of the American Society of Civil Engineers[2] give two classes of tests for soundness, or, as they term it, constancy of volume. The normal test is made with pats kept at a temperature of about 70 degrees Fahr. for several weeks, while the accelerated test indicates the quality of the cement within about twenty-four hours. The apparatus required for soundness tests consists simply of a piece of plate-glass, which for temporary use need not be over ¼ inch thick and, say, 12″ x 18″ square, a small trowel, preferably a 3-inch pointing trowel, the scales for weighing the cement, a measuring-glass for the water and as many pieces of thin glass about 4 inches square as there are pats of cement to be made.

For testing Portland-cement take samples at random from several barrels or bags, every tenth barrel is a common practice, and mix each sample separately with about twenty per cent of its weight of water. Eight ounces of cement will make two pats of cement, one of which may be placed in water after setting for twenty-four hours, and the other subjected to an accelerated test as described below. The exact proportion of water, which can best be measured in an eight-ounce measuring-glass, will vary with the brand of cement, and if the desired consistency is not obtained with the first proportion selected, repeat the operation with more or less water. The Committee of the American Society and also authorities in Europe recommend the use of a special apparatus for determining when the cement is mixed with just the right amount of water to give it the proper consistency. This "Vicat apparatus" consists of a cylinder, for this purpose 1 centimetre diameter, which, weighted with 500 grammes, is allowed to penetrate into a thin disc of cement. The normal consistency is obtained when the cylinder penetrates to a specified distance. For tests of soundness such as we now have in mind, where no laboratory is at hand, the consistency can be determined well enough by the appearance of the paste. Sufficient water should be added so that the cement can be kneaded with the fingers without crumbling, and so little that when the pat is pressed onto the glass it will maintain its shape without spreading.

The temperature of the room where the mixing is done and where the samples are kept should be from sixty degrees to seventy degrees Fahr., and the water should also be about that temperature. The cement is weighed out and placed in a little pile upon the plate glass, and a depression formed in the centre, into which all of the water is poured. The cement from the outside of the ring is turned over into the water, and the water gradually penetrates the mass. This should not take over one minute, and then the paste is kneaded with the hands for about one and one-half minutes in the same way as one would knead dough. One or more balls are formed of the paste, and each one is pressed down onto one of the square plates of glass, so that a circular pat is formed about 3 inches in diameter and ½ inch thick in the centre, tapering to almost nothing at the edges.

For the normal test of cement, a pat from each of the packages sampled is allowed to remain in moist air for twenty-four hours and is then immersed in water. The reason for requiring moist air is to prevent shrinkage cracks upon the surface. A special moist closet may be used for this purpose, or a wet cloth may be spread above the pats so that it does not quite touch them, and the ends immersed in water to prevent its drying. The pat is examined from day to day during a period of twenty-eight days, and should show no signs of cracking, checking, swelling, distortion or disintegration.

Some authorities, among them the engineers of the Navy Department and the engineers of the New York Subway, require a similar pat to remain in air for examination for cracking and also for uniformity of color. An unsound cement will generally show defects within three days. Some specifications require only a seven day normal test for soundness, but the majority specify twenty-eight days.

A cement which shows defects of the character described is said to "blow," and it is designated as a "blowey" cement. The cracking and disintegration are due to expansion caused by chemical action. Cracks due to unsoundness must be distinguished from shrinkage cracks and hair cracks. *Shrinkage* cracks, which often appear on the surface of pats or briquets on account of too rapid drying, appear during setting instead of after the cement is set, and occur as irregular curved lines over the surface which cross and recross each other. *Hair* cracks appear sometimes on cement work when neat cement or cement with too small a portion of sand is used, and sometimes also where such a large excess of water has been employed in mixing that it does not dry off until the cement is set, and then there is deposited a very thin coating of cement which has remained in suspension in the water. *Expansion* cracks are distinguished from those due to improper manipulation of the cement by running from the edges toward the centre of the pat. They widen out as the distance from the centre increases. It is the expansion cracks which show the unsoundness of a cement.

Distortion may be detected, if the cement does not remain attached to the plate upon which it is placed, by applying a straight edge against its lower surface.

Puzzolan cements are tested for soundness in the same manner as Portland-cement, by making up pats and placing them under water when set. About eighteen per cent of water, by weight, is required for mixing Puzzolan cement. This quantity, in fact, is specified by the United States Army engineers, although most authorities allow a variation in quantity for different cements.

For natural-cement less reliance can be placed on tests for soundness, and some specifications omit it entirely. Natural-cement requires about thirty per cent of water by weight.

To obviate the delay required in allowing a cement to set for so many days before it can be determined whether it is of good quality, numerous methods have been suggested for hastening the set and chemical action by means of heat. There has been a great deal of discussion as to just how far the results obtained from hot tests may be used to indicate the character of the cement, but it is generally recognized by foremost authorities in this country and abroad that accelerated or hot tests will give a fair indication of the quality of a cement.

A number of methods of accelerating the action of the cement have been devised. Some of them expose the specimen to moist heat and others to dry heat. One of the simplest methods is that recommended by the Committee of the American Society. After keeping the pat of cement in moist air for twenty-four hours, it is exposed in any convenient way in an atmosphere of steam above boiling water in a loosely closed vessel for three hours. It will be seen that this requires the use of no apparatus, not even a thermometer, except a vessel like a wash-boiler with some kind of a grating arranged above the surface of the water on which to place the specimens after the water has been raised to the boiling point. An alternate method suggested by the Committee of the American Society is that of keeping the pat twenty-four hours in moist air, and then placing it on a shelf in a vessel filled with fresh water. The water is gradually raised to a temperature of 115 degrees Fahr., which is maintained for twenty-four hours. By this method the soundness is determined by the appearance of the pat, as described above.

Although the methods advocated by the Committee of the American Society are probably the simplest and best of any accelerated tests, it may be of interest to outline several other ways of accomplishing a similar result: —

Henry Faija's Method. — As soon as a pat is gauged it is placed on a rack above the water, which has been previously raised to a temperature of 115 degrees to 120 degrees Fahr., in the inner vessel of the Faija apparatus and kept there for six or seven hours. This apparatus consists essentially of a covered double vessel, the inner one containing a rack and a thermometer which runs through a hole in the cover and down into the water below the rack. The space between the outer and inner vessel is filled with water which equalizes the temperature. The temperature of the moist air in the inner vessel will be between 100 degrees and 105 degrees Fahr. After six hours the pat is placed in the water below, and allowed to remain until the next day. If the pat shows signs of blowing, another sample of the cement is spread out to aerate or cool for three or four days, when if it again fails to pass the hot test it is reckoned as unsound.

M. Deval's Method. — Pats are left in moist air for twenty-four hours, then placed in a hot-water bath at a temperature of 176 degrees Fahr. for six days or more, when unsound cement should show signs of expansion. A briquet one day in air and three days in hot

[1] Copyright, 1903, by Frederick W. Taylor, M. E., and Sanford E. Thompson, Associate Member American Society of Civil Engineers.

[2] Progress Report of Special Committee on Uniform Tests of Cement in *Proceedings* of the American Society of Civil Engineers for January, 1903.

bath develops, according to Deval, a tensile strain equivalent to that it would attain in seven days in ordinary cold water. One day in air and six days in the hot bath, the strength is equivalent to one day in air and twenty-seven days in the cold water.

Dr. Michaelis's Method.[1] — Two balls 1½ inches to 2 inches in diameter are placed twenty-four hours in moist air, then placed in a water bath, which is gradually (in not less than thirty minutes) raised to the required temperature and maintained there for three hours. The sample after cooling should be sound and free from cracks or warping. For Portland and Puzzolan cements the temperature of the water is 212 degrees Fahr., and for natural-cements 122 degrees Fahr. The water must be renewed for each succeeding test.

United States Army Method, 1901. — As soon as a pat is set, it is placed in water, which is raised to the boiling point and kept there for about six hours, then allowed to cool. The pat should show no cracks or distortion.

United States Navy Method, 1901.— A pat is allowed to set, and is then immersed in water at a temperature of 212 degrees Fahr. for a period of twenty-four to forty-eight hours, when it should be in good condition.

Oven Tests.[2] — Pats are placed on supports in a basin which contains at the bottom a very small amount of water. This is heated so that all the water is driven off in from three to six hours, and the cement is left dry. While the water remains, the temperature is about 95 degrees Centigrade. The heating is still continued after the water disappears by raising the temperature of the air in the vessel to 120 degrees Centigrade. The interior of the specimen will then be about 100 degrees Centigrade. There is difficulty, Professor Tetmajer remarks, in performing this experiment with uniformity.

Tests of Red Heat. — A ball several centimetres in diameter is placed on a triangle, and heated by a gas-flame. The heating is regulated so that after one-half hour the temperature is about that of the hand, and after the second half hour reaches 90 degrees Centigrade; then the heating is continued until the bottom of the ball is raised to a red heat.

Chimney Expansion Test. — A test which is sometimes used for determining undue expansion is to mix up a small quantity of neat cement and press it solidly into a straight lamp chimney. The swelling of a defective cement will break the glass. This test has no special advantage over the normal tests described, and does not show so clearly the degree of unsoundness.

[1] Reported by Dr. Michaelis as Chairman of Committee at the Fifth International Convention for Unifying Methods for Testing Construction of Materials, at Zurich in 1895.

[2] Quoted from Tetmajer by M. H. LeChatelier in his report to the French Commission.

THE ROYAL GOLD MEDALLIST.

AT the meeting of the Royal Institute of British Architects, June 22, the President, Mr. Aston Webb, R. A., spoke as follows: —

"*Your Excellency, Ladies and Gentlemen*, — As you all know, we are met together to-night to present the Royal Gold Medal for the promotion of architecture, annually given by his Majesty the King to 'some distinguished architect or man of science or letters who has designed or executed a building of high merit, or produced a work tending to promote or facilitate the knowledge of architecture or the various branches of science connected therewith.' The mode of selection is that a name is brought forward by the Council and submitted to the general body of members of this Institute, after which it is submitted to the King for his gracious approval. Among those to whom the medal has been awarded, and who are now no longer among us, are Professor Cockerell, the first recipient in 1848; Sir Charles Barry; Owen Jones; Sir Gilbert Scott; Viollet-le-Duc; Sir James Pennethorne; George Edmund Street; John Pearson; Baron von Ferstel; F. C. Penrose; H. Schliemann; Charles Garnier; Baron von Hansen; R. M. Hunt; and Lord Leighton.

"In selecting a recipient for this honor it has almost become an unwritten rule to select in rotation an English architect, a foreign architect, and a literary man with architectural instincts. This year we have somewhat departed from this rule, and, as you know, our Institute has selected, with the full approval of his Majesty the King, Mr. Charles Follen McKim, of New York, and Mr. McKim has returned us the compliment by crossing the Atlantic especially to receive the medal in person to-night; and here he is, I am glad to say, safe and sound with us this evening, and very heartily we all welcome him. I have said that in selecting Mr. McKim we have somewhat departed from our rule, for we cannot claim him as an English architect, we have not selected him for his literary attainments, and, least of all, can we consider him as a *foreign* architect. No, we have selected him as a highly-distinguished American architect, a very near relation of ours, and a representative man, in order that we may show to him personally and to the whole world of American artists our high appreciation and admiration of the great work that marvellous country is doing on the other side of the world; an appreciation not only of what they are doing, but also of what we expect them to do, untrammelled by traditions, full of youth, energy, imagination and initiative, and supported by almost boundless resources; and we are confident that as time goes on, they will not only develop fresh types and plans of buildings, but they will, though still mindful of the past, clothe those buildings in a language that will be distinctly their own.

"As I have already said, this selection has met with the full approval of his Majesty the King; and I venture to hope that the presence here to-night of the Ambassador himself from the American people to our Court may be taken as setting the American seal on this selection of ours also.

"And now I must introduce you to Mr. McKim a little more in detail, in order that not only those present, but also those who read these proceedings, may fully understand our choice. I may say my facts may be depended upon, for I have received them from the best authority, Mr. McKim himself. He was born in Chester County, Pa., six and fifty years ago, and at eighteen entered Harvard University with a view to becoming a mining engineer. A year later, finding the work uncongenial, he entered the office of Mr. Russell Sturgis, architect, of New York, and in the autumn of the same year, the Atelier Daumet in Paris, where he was prepared for, and admitted to, the École des Beaux-Arts, remaining till the outbreak of the war some three years later. During this time Mr. McKim also travelled in Europe, and visited England in 1869, where, he tells me, through the kindness of Mr. Phené Spiers, Mr. Florence and others, he was able to make profitable use of his time, as far as cricket matches would permit. He also was made an Honorary Member of the Architectural Association. Returning to New York in 1870, Mr. McKim entered the office of the well-known architect, H. H. Richardson, and in 1872, at the age of twenty-five, commenced practice on his own account, being joined in 1877 by Mr. Wm. Rutherford Mead, and in 1879 by Mr. Stanford White, and since that time they have continued their practice as 'McKim, Mead & White.' In 1887 they were appointed architects to the new public library of the city of Boston, now a famous building. In 1889 two fellowships in the School of Architecture, Columbia University, known as the McKim Fellowships, were established. In 1891 Mr. McKim was made a member of the Commission of ten architects from throughout the United States to design the World's Columbian Exhibition at Chicago; in 1894 the firm were appointed architects of the new Capitol building of the State of Rhode Island; in 1897 the American Academy of Architecture in Rome was incorporated under the laws of the State of New York, and Mr. McKim was made President. In 1899 he was elected a member of the Academy of San Luca, and in the same year was appointed to serve as a member of the first Municipal Art Commission of the city of New York. In 1901 Mr. McKim was appointed a member of the Park Commission for the improvement of the park-system of the District of Columbia, and assisted in drawing up the magnificent scheme, photographs of which are exhibited here to-night. Here there is to be an avenue 1,600 feet wide and a mile and a half long, architecturally treated at various points, with great public buildings incorporated in the scheme. The cost is put at some three to four millions, some half of which has already been voted. A bill has also passed Congress for locating the memorial.

"Mr. McKim was elected President of the American Institute of Architects in 1901, and reëlected in 1902, and in the same year appointed by President Roosevelt to restore the White House, and also as architect for the new Army War College.

"Of the buildings erected[3] some idea may be gained from the

[3] The following is a complete list: — 1879-1893: Casino at Newport, R. I.; House of Louis C. Tiffany, Esq., New York; Houses of Henry Villard, Esq., New York; The *Judge* Building, New York; The Imperial Hotel, New York; House of the Hon. John A. Andrew, Boston, Mass.; The Algonquin Club, Boston, Mass.; The Public Library, Boston, Mass.; Country House of Mrs. William Edgar, Newport, R. I.; The Freundschaft Club, New York; The New York Life Insurance Co.'s Buildings at Kansas City, Mo., Omaha, Neb., and New York; Country House of C. J. Osborn, Esq., Mamaroneck, N. Y.; Country House of Colonel Elliott F. Shepard, Scarborough, N. Y.; St. Peter's Church, Morristown, N. J.; House of General Charles A. Whittier, Boston, Mass.; House of F. I. Amory, Esq., Boston, Mass.; House of the Hon. Richard Olney, Boston, Mass.; Deutscher Verein, New York; First Methodist Episcopal Church, Baltimore, Md.; Judson Memorial Church, New York; Country Houses of E. D. Morgan, Esq., at Newport, R. I., and Wheatly Hills, L. I.; House of the Hon. J. Hampden Robb, New York; Power house and Office-building of the Broadway Cable Railway, New York; The Bowery Savings-bank, New York; The Century Club, New York; The Power-house of the Niagara Cataract Co., Niagara Falls, N. Y.; The Germantown Cricket Club, Philadelphia, Pa.; The Metropolitan Club, New York; Country House of H. McK. Twombley, Esq., Madison, N. J.; Office-building of Messrs. Cornelius & W. K. Vanderbilt, New York; The Washington Memorial Arch, New York; The West Point Battle Monument, West Point, N. Y.; The Walker Memorial Library, Bowdoin College, Brunswick, Me.; The Public Library, Naugatuck, Conn.

1893-1903: The Agricultural Building and New York State Building at the World's Columbian Exposition, Chicago, Ill.; Building of the New York *Herald*, New York; Museum Building of the Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y.; The Columbia University, New York; The University of Virginia, Charlottesville, Va.; The University of the City of New York, New York; Radcliffe College, Harvard University, Boston, Mass.; Building of the Medical Department of Cornell University, New York; Building of the Architectural Department, Harvard University, Cambridge, Mass.; The Harvard Union, Cambridge, Mass.; Campus Fence and Gates, Harvard University, Cambridge, Mass.; The Harvard Club, New York; The University Club, New York; The Capitol of the State of Rhode Island, Providence R. I.; Symphony Hall, Boston, Mass.; The Cullom Memorial Building, West Point, N. Y.; The Public Library, Orange, N. J.; The First Congregational Church, Naugatuck, Conn.; The Detroit Savings-bank, Detroit, Mich.; The Carnegie Branch Libraries, New York; House of George A. Nickerson, Esq., Boston, Mass.; Country House of Herman Oelrichs, Esq., Newport, R. I.; House of Thomas Nelson Page, Esq., Washington, D. C.; Country House of Frederick W. Vanderbilt, Esq., Hyde Park, N. Y.; Country House of Ogden Mills, Esq., Staatsburg, N. Y.; House of Hon. Levi P. Morton, New York; House of Joseph Pulitzer, Esq., New York; House of R. W. Patterson, Esq., Washington, D. C.; Country House of Clarence H. Mackay, Esq., Roslyn, L. I.; Country House of the Hon. William C. Whitney, Roslyn, L. I.; Town House of the Hon. William C. Whitney, New York; The White House (Executive Mansion), Washington, D. C. — Restoration.

Now in Course of Construction: The Bank of Montreal, Province of Quebec,

splendid series of photographs and drawings Mr. McKim has kindly shown us here to-night. He seems equally at home with a palace or a bungalow, with a university or a railway-station, with laying-out a great park scheme or arranging a charming little formal garden. In all I think you will find artistic feeling, nobility of plan, breadth of treatment, absence of unnecessary or meretricious ornament, and a suitability of purpose. The style, based largely on Italian examples, shows the influence of French training, and, while founded on traditional lines, appears to me to show just that amount of individuality required, and without which the best work must be dull and uninteresting.

"Then, again, Mr. McKim has set all us architects an example by the opportunities he has given to painters and sculptors to further adorn his works. The decoration of the Boston Library by Mr. E. A. Abbey, who I am glad to say is here to-night, and by Mr. Sargent, who would have liked to have been here but is still abroad, is a case in point, and is well illustrated by photographs here to-night.

"And now, Mr. McKim, it only remains for me to present you with this medal as an English token of our admiration and esteem of yourself and your colleagues. May you long live to still further adorn your country with your works!"

The Chairman then placed the medal round Mr. McKim's neck, amid loud applause.

Mr. McKim, in response, said: —

"*Mr. President, Your Excellency, Ladies and Gentlemen,* — I am no speaker, and if I were it would be quite beyond me to adequately express to you my appreciation and deep sense of obligation to his Gracious Majesty King Edward and to the members of this Royal Institute of British Architects. The broad philanthropy which created this medal, not alone for British subjects, but that it might help and encourage the successful development of the art of architecture in other countries, was characteristic of the Most Gracious Queen whose memory we, next to you, hold in veneration. That it should have a second time within a single decade come to our shores is indeed cause for felicitation, since it attests, in lasting form, the progress and achievement your eminent body has been pleased to recognize in the work of your younger colleagues in America.

"The medal which you do me the high honor to bestow on me is pure, at least, in virtue of my accidental Presidency of the American Institute, but is, I feel, to be regarded in a far larger sense than as a personal recognition of the ties which unite the builder's art on both sides of the Atlantic. As a spur and incentive, and as a token of the friendship and respect that for many years have been growing up between our two bodies, I accept with grateful pride this medal, tendered, as to my countrymen, by the Royal Institute. I accept it for the whole profession in the United States, and I accept it for my associates of twenty-five years, to whom I owe everything. As the bearer of many messages from across the seas, I cannot let such an occasion as this pass by without, at least, briefly adverting to the ties which have united us in the past, and which must render the development of our future of something more than passing interest to you. I will add also a word concerning recent events on our side of the water.

"The early buildings of the New England coast, dating back to the eighteenth century, and, more rarely, to the seventeenth, from the once vice-regal town of Portsmouth, to Charleston, S. C., have happily descended to us despite political revolutions. Notwithstanding their simpler forms, both of construction and design, made necessary by slender means and the circumstances of transplantation, they still reflect the mother country in their excellence of construction as well as sound and correct taste. Precisely the most interesting, and in their sphere the most admirable, architectural monuments of my native land, private dwellings and public buildings alike, are those that most strongly recall their English prototypes. Our obligations, for instance, to Sir Christopher Wren are very imperfectly understood even at home, yet the cities of the Atlantic seaboard, especially in New England, abound in examples showing the influence of his school.

"The struggle of these landmarks for existence in the advancing tide of commercial prosperity before which they are gradually being swept away is a melancholy daily spectacle; not alone deplorable in the loss of historic monuments, but for the lessons they invariably teach of sound proportion, simplicity and good manners. Happily some of the best examples remain to us. At the seat of Government, for instance, our Capitol, and the home of the President, the White House, are both singularly animated by a pure taste and devoted love of beauty, not to mention the City-hall and the old Department buildings of the city of Washington. Of these, for our information at home, as well as yours, let us gratefully acknowledge that the Capitol, though enlarged and changed since, was originally designed by one William Thornton, the White House by a certain James Hoban, while the City-hall and old Department buildings were the creation of a man of the name of Hadfield — *all Englishmen!*

"I can well remember the thrill of surprise and pleasure which I experienced on my first visit to England, more than thirty years ago, in the discovery of a strange familiarity in the appearance of things, and in the sense of not being after all so far from home. Though I did not understand it then, the reason, as has been shown, was not far to seek. I will venture to refer to one more building, of the era which we call "Early" and you ingloriously "Late," albeit of the period of Adam — the Octagon.

"Our Institute, which has urged upon governments, national, state and municipal, the duty of preserving historic monuments, has itself recently secured possession of one of the historic houses of America, known from its shape as the 'Octagon,' and designed by the same William Thornton, architect of the Capitol. Here in the early days was dispensed a liberal hospitality by President Madison, whose home it was. Under its roof, too, the Treaty of Ghent was signed. The house was finished in a manner befitting its importance, and to-day is in an excellent state of preservation. Thus the expressed desire and often-recurring efforts of our Institute to secure for itself a permanent home have been accomplished after nearly half a century of existence. May it typify to those who assemble in it, as well as to the people of the city of Washington, the spirit of public service.

"Our Institute has ample reason for felicitation in both the increase and betterment of our own schools of architecture, in Harvard, Columbia, Pennsylvania, Cornell and Chicago universities, as well as in the admirable and still older foundation of the Institute of Technology in Boston. The movement to endow an American Academy of Fine-Arts in Rome on the general lines of the French Academy in the Villa Medici is not new. Till now dependent for support upon the insufficient means at the command of the incorporators (members of the Institute), the number of scholars has of necessity been small, and the conveniences for work not such as would be afforded by an older, well-equipped and well-endowed institution. Nevertheless, in spite of its vicissitudes, such has been the quality of the men and work turned out, so strong the conviction of those most deeply interested in the need for an institution offering a post-graduate course intended only for those who shall be already technically well equipped, that a bill for the incorporation of the American Academy in Rome by Act of Congress, and asking the protection of the United States Government, was introduced in 1901 by the late Senator McMillan. The persons named as incorporators, besides the leading architects, painters and sculptors, include the great universities and technical schools, represented by their Presidents, the Secretaries of State and War, the Librarian of Congress, the Government architect, and a considerable number of names of men chosen from the community at large known for their interest in art and art education. This bill passed the Senate, and was favorably reported to the House; but owing to the legislative conditions prevailing in the latter body during the closing weeks of the session, it failed to become law. I am happy to say that it will be reintroduced in the coming Fifty-eighth Congress and is considered to have every prospect of success. Indeed, we seem to be living in a new age, not only in our private enterprises, but in our relations with the Government. It was no small thing that a committee of the United States Senate, under the leadership of the deeply-mourned Senator McMillan, called into consultation, officially, the Institute and accepted the advice of its Committee in the formation of a commission to prepare plans for the improvement of the park-system of the District of Columbia, including the location of public buildings.

"Following this lead have come frequent requests from Government officials on the various and often perplexing problems of their departments, so that, informally and unofficially, there has come to pass a seeking for expert advice as gratifying as it has been unusual. The forces which have brought about plans for the improvement of the National Capital are acting throughout the land. Not only in the Atlantic seaboard city of New York and the cities of the Lake region like Buffalo, Cleveland and St. Paul, but even from far-away Seattle, on the Pacific Coast, comes the news of attempts to treat the city as a unit and to develop a municipality as a consistent work of art. It is worthy of note also that as the star of progress takes its western way, the effort at improvement is made with increasing vigor in both enthusiasm and money. As evidence of the times, and among the measures voted by the last (Fifty-seventh) Congress for new buildings to be erected within the District of Columbia alone, I will quote the substance of a single paragraph from the Report of the Senate Commission of the District of Columbia, dated March 14, 1903: —

"'The Fifty-seventh Congress, besides the restoration of the White House, authorized the construction of the Army War College and the Engineer School of Application; a building for the National Museum . . .; the Union Railroad Station; an office building for the use of the members of the House of Representatives; a Municipal Building for the District of Columbia, and a Hall of Records. The cost of these buildings completed will approximate not less than fifteen millions of dollars, or over three millions sterling.'

"I cannot conclude without an expression of appreciation for one whom your eminent body so recently did honor. After nearly half a century of successful endeavor, during which Mr. Hunt held aloft the banner and fought the battles of the Institute, and in the fulness of his powers, at a time when his influence was greatest, he was suddenly taken away."

The Chairman said they were honored that evening by the

Can.; The New York Terminal Station, Pennsylvania Railroad; Library Building for J. Pierpont Morgan, Esq., New York; The Army War College and Engineers' School, and Washington Barracks, Washington, D. C.; The New Bellevue Hospital, New York; Building for the Gorham Company, Silversmiths, New York; Building for Tiffany & Company, Jewellers, New York; Building for The Knickerbocker Trust Company, New York; Officers' Mess Hall and Quarters, West Point, N. Y.; The Harmonie Club, New York; House for James Stillman, Esq., New York; House for L. C. Hanna, Esq., Cleveland, O.; House for T. B. Wanamaker, Esq., Philadelphia, Pa.

presence of the American Ambassador, Mr. Choate, and they would be glad to hear a few words from his Excellency.

Mr. Choate said he was present in a three-fold capacity: first, and he thought most important, as the personal friend of Mr. McKim; second, as a Harvard man, representing a University which was so proud of Mr. McKim; and third, as the official representative of his country, upon which, in honoring Mr. McKim, the Institute had conferred a lasting and highly appreciated honor. He knew how dangerous it was for a layman to appear and speak before a company of distinguished professional men, but he believed that in either of the three capacities he had mentioned he could say a word or two without coming into conflict with that technical criticism which arose in the minds, if it did not fall from the lips, of those who listened to one who was emphatically a layman. It had been his good fortune to know Mr. McKim from boyhood — he was sorry to say it was from Mr. McKim's boyhood and not from his own — and it was not exaggerating the estimate of his friends to say, in view of his whole-souled attention to his art, to the sweetness and simplicity of his character, and to his enthusiasm for the profession which he so highly honored, that from the beginning of his career they thought that Mr. McKim would receive, if not that medal, the highest honor which his professional brethren throughout the world could confer upon him. As a Harvard man he rejoiced to be there that evening. Perhaps they knew — if not, he would tell them — that Harvard bore the same relation to American life that Oxford did to the life of Great Britain, and Harvard was particularly proud of this son whom they had selected for that distinction that night. She had already conferred upon Mr. McKim one of her honorary degrees, and he believed that the day was not far distant when she would again select him to confer upon him the highest degree known to her. As the representative of his country, he had no hesitation in saying that if they put it to the vote of the whole American people who among her distinguished sons was most worthy of this honor, by a practically unanimous vote they would have selected Charles Follen McKim. And if they had called for a vote of the Congress of the United States as representing the power and judgment of the whole community, they, too, would have selected him, because, with their approval, he had been selected to take an important part in the Commission — a Presidential Commission, corresponding very much to a Royal Commission here — as to the laying out, the restoration of the city of Washington — a development of the city of Washington upon the lines and according to the plans which received the approval of the Father of his Country, George Washington, more than 100 years ago: not only their capital city, but their Republican palace, the White House — a symbol of the homely, the unambitious, which did not venture to compete with any of the palaces of the Old World — the home of their President, which every ingenuous American boy was taught to look to as his possible future residence — not only the White House, but the city itself, had been laid out upon the more generous plans of the Father of his Country instead of upon the mistakes, should he say, which subsequent generations had allowed to be developed. It was thought a few years ago that it would be wise to select a commission of competent architects to see whether the original plans of Washington could be again brought to life and restored, and put into practical operation both as regards the White House and the city itself. It was no secret that to the genius of Mr. McKim and his associates on that commission was to be ascribed the success which had resulted in the complete restoration both of the palace itself and of the city of which they were so proud. The President of the United States, from his life-long friendship and heartiest sympathy with Mr. McKim in all the successes and incidents in his career, would have joined in the approval of the selection of Mr. McKim for the honor which had been conferred upon him. It was his (the speaker's) good fortune to have known Mr. Richard Hunt, who was honored by the Institute some ten years ago in the same way, and he thought he could say of both gentlemen that, in the immense development of their art which had taken place in the United States during the last thirty years, they were entitled to a very great share of the credit. After the Civil War, and when it was established once and forever that the United States was to be a nation, one and inseparable — an indestructible union of indestructible States — there grew up, throughout the length and breadth of the land, an ambition to improve, to adorn, to glorify its buildings, both public and private; and, as Mr. McKim had said in his address, from Boston, on the shores of the Atlantic, to Seattle, on the shores of the Pacific, this purpose grew up of acquiring, of having, of living in buildings remarkable alike for their beauty and their utility, and of having public buildings worthy of the municipalities and of the country — of their wealth and power — which they represent. This had been the universal idea, and the result was that America had been, is now, and was likely to be in the future, a perfect paradise for architects. There had grown up, not a school only, but many schools of architecture connected with the great universities, and they were sending forth year after year numbers of young men highly qualified for the pursuit of the profession. These young men were following in the footsteps of Hunt and McKim, and, if he mistook not, in the future there would be added to this fraternity of architects — for he believed they were one great fraternity throughout the world — a noble contribution from the United States, of whom, like the recipient of the medal that night, they would have reason to be proud.

The Chairman called on Sir L. Alma-Tadema, as one interested in American art, to say a few words.

Sir L. Alma-Tadema said he was glad to welcome Mr. McKim, because Mr. McKim was more or less one of them. In the Royal Academy they had always felt that American artists belonged to us and we to them, that artists were one great fraternity. He knew there were many beautiful things in America, for a friend of his once remarked that if they wanted to write a history of the art of the nineteenth century, they could not do it without going to America, and he believed the same remarks applied to architecture.

Mr. E. A. Abbey, R. A., who was also called on by the Chairman to address the meeting, said he was not accustomed to public speaking; he tried to express himself in another way. The Chairman had referred to the great scheme of the American School in Rome, which was a beginning of a sort of Renaissance of the wedding, he might say, of the three arts of painting, sculpture and architecture, which had been separated too long. This School in Rome, which owed so much to Mr. McKim's energy and devotion, was one which he hoped one of these days English students would go to as to a sort of Mecca — a sort of University of the Fine-Arts, which by that time would be much more brought together. He was glad to be present that evening to testify to Mr. McKim's devotion to his art.

The Chairman said there was a request which they would like to make to Mr. McKim. When Mr. McKim went back to America they would not have the advantage of hearing him as they would like; but the Institute had a list of honorary corresponding members, and they would all like Mr. McKim to consent to become one of their honorary corresponding members, so that, in that way, they might have the advantage of hearing from him from time to time what was being done on the other side of the Atlantic.

Mr. McKim: "I shall be extremely glad to be associated with you in that way."

The meeting then concluded.

THE CITY OF SALONA.

THE buried city of Salona, where Diocletian was born, is four miles from Spalato, where in A. D. 313 he died. It was established as a Roman colony in the first century before the Christian era, and must have been a very large city, for traces of the walls are distinguishable for miles (writes a correspondent of the *Times of India*). Its greatest diameter is along the line of the Castelli Bay, but it stretches up the gentle acclivities at the foot of the first range of the Dinarics that separate Dalmatia from Bosnia and Herzegovina. Before the recession of the sea it had a good port and a fine situation, for it borders the southern end of one of the most beautiful tracts in Dalmatia, the Riviera delle Sette Castella. Its opulence must have been a source of envy to the incessant procession of marauders who fell upon this coast. It was raided by Odoacer in the fifth and by Totila in the sixth century, and was finally destroyed by Goths and Croats in 639. From the date of its abandonment it has been left at the mercy of rain and winds and desolating dust. It has to be dug up out of its grave where it has been partly protected but entirely forgotten under 8 to 10 feet of mould. These excavations began in 1847, and they have continued since with the slowness and interruptions so characteristic of dear, drowsy Austria. It is hard to understand why so much money and international coöperation are devoted to Babylonia when archæological treasures of deep and pathetic interest to the Christian world can be laid bare close at hand at very little cost. For the soil over Salona can be conquered with the spade. If it had nothing but its Christian antiquities to show, its tombs of the saints whose names are treasured in the martyrology of the Diocletian persecution, no Christian traveller could possibly pass it by. To move among these tombs, to touch the dust and reverently tread the mosaics of these old basilicas just unearthed from the fields that, half desolated, have protected them, is like one's first visit to the Catacombs. That man, if he be a Christian, is not to be envied who has not felt the tide of emotion surge within him at such a moment. Salona gave to the Church one of the greatest persecutors; but Diocletian disappeared, leaving the victory to the martyrs whose blood and dust make these sanctuaries holy. The episcopal basilica, on a lower terrace than the basilica of the cemetery, is almost entirely uncovered. Many of the little cubes in the mosaic of the apse have parted from the mortar, and something should be done at once to fix and protect them from our insuppressible and contemporary Goth. The pediments of the sixteen columns of the nave are in their place, but the shafts are in fragments. The design is perfect. It is curious to note the portion of the edifice annexed to the church, but outside it, which was set apart for catechumens and for Christians undergoing the canonical penances. The church covers the site of a former Roman villa, for under a portion of the foundations is visible a handsome mosaic floor delineating one of the muses. The name of the muse — Terpsichore, if I remember rightly — is embedded in the plan of the picture. But the basilica of the cemetery of Monastirine on the upper ground is one to which visitors

mostly flock. Underneath and buried in its walls and all round the plateau are the graves and sarcophagi of the Christian dead. These sarcophagi have the massiveness of monoliths. The tops, sloped like a double roof, have the corners finished in curved pyramidal segments. Great force must have been employed to scatter such dead weights of limestone in reckless disorder over the ground. The entire floor of the basilica is covered with sarcophagi, all desecrated, and underneath the church are family vaults into which you can look. The monogram of Christ is everywhere. The evidence goes to show that the Catholics of the time had men of wealth among them.

BOOKS AND PAPERS

THE sculptures of the Parthenon form probably the most conspicuous example in the world's history of a vast scheme of plastic decoration consistently devised as a whole and executed in a manner which has never been in any respect equalled. The study of these sculptures shows how thoroughly the Greek art at its height was imbued with the spirit of unity and how extraordinarily the artists of that time were able to unite the highest perfection of sculptured art with the utmost harmony in general conception, correlation and subordination to the building as a whole. It is in these respects that Greek sculpture shines preëminently and it is this unity in diversity, subordination in individuality, that are made particularly manifest in the work [1] on the subject which Dutton has just published. The author, by his long study and familiarity with the antiquities in the British Museum, is qualified to speak as an expert in matters of observation and detail, and these are points with which the book is specially occupied. The wealth of sculpture about this building is something marvelous. The frieze around the cella is 522 feet in length, sculptured all along with figures nearly half life-size, in many parts densely crowded till the marble could carry no more, the whole in very low relief and executed with marvelous detail. There are ninety-two metopes, each consisting of a group of two figures two-thirds life-size, in the highest possible relief and full of the most beautiful workmanship. Each of the two pediments is filled with an immense group of statues, the smallest equal to life-size and the central figures colossal, and the crowning work of all was the statue of Athena in gold and ivory, compared with which the external sculptures of the Parthenon, extraordinary as they were in extent, in grandeur and in beauty, were of secondary importance. This statue appears to have been built up with a framework and backing of wood, but entirely covered with beaten gold for the garments and ivory for the exposed flesh. It stood 40 feet high and the grandeur of a temple properly fitted to receive so magnificent a statue can hardly in these days be fully appreciated. It is extremely probable that color was lavishly used to help out the architectural forms and to adorn the interior of the temple. It will be remembered that the art building erected in Nashville at the time of the Tennessee Exposition was as nearly as possible a replica of the Parthenon and the enthusiasm which this copy aroused in all classes and conditions of visitors can give us some idea of how passionately the magnificent original must have impressed itself upon the hearts and the minds of the singularly artistic Athenians of the time of Phidias.

Professor Murray's book is the work of a careful, painstaking archæologist, with a love for art. His enthusiasm for his subject leads him to see some things and to draw some conclusions with which we cannot always agree. As, for instance, he seems possessed with the belief, as he puts it, that the sculptor of the Parthenon was the first to lay down the rule that reliefs in a diffused light must be kept low, in exposed lights as high as possible. However this may be as a practical rule, it is not the reason for the difference in relief which we find in the Parthenon between the different groups of statuary. It seems fairer to assume that the subtile minds of the Greek artists felt that the pediments required a bold treatment of heroic proportions in full relief because they represented the most emphatic decorations of the building. Likewise a delicate flat treatment of the metopes would be lost by comparison with the bold cutting of the triglyphs and the heavy emphasis of the horizontal line. On the other hand, the low relief of the frieze was not due to its being in the shadow, but rather because the frieze was treated in a thoroughly decorative sense and excessive relief was avoided with much the same feeling that in our decorative paintings of to-day we strive to avoid sharp contrasts of planes. This sufficiently accounts for the variation in the treatment of the sculptures without the slightest reference to light. The metopes and the pediments were meant to strike one at a glance, to throw their whole force and impulse toward the beholder, while the beautiful frieze was for after and more quiet study, and well does it repay study. Ruskin has most beautifully shown us how cleverly the planes of the sculpture were crowded together. Professor Murray brings out one detail which has been noted before but which is so cleverly treated that we do not appreciate how far it was conventionalized, namely, the horses' tails and manes. We are accustomed to think that a long, flowing tail is a beauty in a horse. On the whole Parthenon frieze there are but two or three instances of this, and for most of the horses it is both curious and instructive to observe with what care the sculptor has studied to hide their tails, and the artistic instinct was perfectly right, as may be gathered from the fact that no one notices the concealment.

The book is thoroughly commendable in its make-up and in the treatment of the subject matter. The illustrations are masterly half-tones from photographs or photogravures, including also, moreover, the numerous drawings by Carrey which were made in 1674 before the explosion which so cruelly mutilated the building. In reading the book one could at times wish that it were less detailed and technical and that the writer did not undertake to attribute quite so much to the sculptor and the sculptures in the way of motives and intent which hardly seem warranted by the remains. But we cannot perhaps expect the higher criticism to be applied rigidly to art and for what the work aims to do it has certainly accomplished it in a most admirable manner.

MR. MIDDLETON'S little book [2] is rewritten and enlarged from a smaller one, now out of print; and, although concise in treatment, it gives all the essential elements of architectural perspective. It may be observed that architectural perspective in England is a different thing from what it is here. Mr. Middleton's system is that of picture-plane, point of sight, and actual plan, tacked to the upper part of the board; a system which has been obsolete among architectural draughtsmen in this country for many years. He understands, it is true, the method, universally used here, of the perspective plan and measuring-points, and gives a clear and intelligent description of it, observing that it is generally in use, even in England, "by all save architectural draughtsmen."

Apart from the difference in the methods of setting out, the two perspective processes are essentially the same, and some practical suggestions are made which are worth remembering. Where the picture-plane and the separate plan are used, Mr. Middleton says that the angle included between two lines drawn from the point of sight to the extreme angles of the plan should not exceed sixty degrees, as otherwise there will be unpleasant distortion; and, for a similar reason, the angle made with the horizon by a line drawn from the point of sight, set off laterally, to any part of the building, as shown in the perspective drawing, should not exceed forty-five degrees. Both these are excellent suggestions; and some more, of great value, are to be found in the chapters on Shadows and Reflections, as well as in those on Isometric Drawing and Finished Perspective Drawing. This last is illustrated by reproductions of drawings by half a dozen of the most accomplished perspective draughtsman in England, giving a variety of beautiful work, on which judicious comments are made. We are so accustomed to seeing rather inferior perspective drawing in the English professional journals that we sometimes forget the surpassing merit of the very best English work. Proud as we are, and with reason, of the skill of many of our perspective draughtsmen, few of them have quite the artistic sense of the very best Englishmen, even where pen-and-ink drawing is concerned; while in water-color work, or in the beautiful Payne's gray and sepia, the Americans are still far behind their Transatlantic rivals.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE WASHINGTON: A DESIGN BY THE LATE BRUCE PRICE, ARCHITECT.

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GARDEN FRONT OF THE SAME HOUSE.

THE GARDEN AND PERGOLA OF THE SAME HOUSE.

BENCH IN THE TRIBUNE OF THE COLLEGIO DEL CAMBIO, PERUGIA, ITALY. THE BROTHERS TASSO, SCULPTORS.

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RANDOLPH HALL: A DORMITORY, CAMBRIDGE, MASS. MESSRS. J. R. COOLIDGE, JR., AND VERNON A. WRIGHT, ARCHITECTS, BOSTON, MASS.

[1] "*The Sculptures of the Parthenon.*" By A. S. Murray, LL.D., F. S. A., Keeper of Greek and Roman Antiquities, British Museum. New York: E. P. Dutton and Company. 1903. Price $7.

[2] "*The Principles of Architectural Perspective*"; prepared chiefly for the Use of Students; with Chapters on Isometric Drawing and the Preparation of Finished Perspectives. By G. A. T. Middleton, A. R. I. B. A. Illustrated. London: B. T. Batsford, 94 High Holborn. 1903. Price 2s. 6d.

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APLEY COURT: A DORMITORY, CAMBRIDGE, MASS. MR. JOHN E. HOWE, ARCHITECT, NEW YORK, N. Y.

NOTES & CLIPPINGS

WASTE BY AMERICAN COLLECTORS. — Herr Bode, a well-known German art writer, contributes to *Kunst und Kunstler* of Berlin a long article deploring the alleged waste of American money upon more or less doubtful works of art sold as of value and antiquity. He greatly praises the collections made in this country by Mrs. Gardner and Messrs. Shaw, Marquand, Havemeyer and Ryerson, but declares that other collectors have not been so fortunate or so wise. The Raphael portrait of Ripalda, he says, was refused by every famous museum in Europe at half the price paid by Mr. Morgan. Its authenticity is unquestioned, but it is called a poor and uninteresting work. Upon the other hand the collections of small objects and bric-à-brac bought by Mr. Morgan from Mannheim of Paris and Gutmann of Berlin are praised as containing pieces of priceless value in German silver, bronze, enamel, etc. Senator Clark, according to Herr Bode, paid five times the value of the Preyer collection of paintings he bought in Vienna last year. The Roman collection of alleged masterpieces by Raphael, Titian, Rubens, Correggio, Rembrandt, Perugino, Botticelli and other masters, sold to Mr. Walters of Baltimore for a sum said to be nearly a million dollars, is characterized as beneath criticism. The fact that the Italian Government, which collects a tax of one-fifth upon the value of all antique works of art sold for export, asked for only $8,000 upon this Mazzarenti collection is considered as conclusive by Herr Bode, who ends his article by saying that while all the pictures and works of antique art bought by Americans in Europe during the last ten years do not equal in value one such collection as that left recently to Paris by the late M. Dutuit, the effect upon artists has been unfortunate; for when the good work of living men is ignored the result is discouragement or a temptation to manufacture "antiquities," to which many competent painters have succumbed. — *N. Y. Evening Post.*

PREHISTORIC ART IN DORDOGNE, FRANCE. — Another grotto in the limestone hills near Eyzies, in Dordogne, France, has been explored for prehistoric pictures with considerable success. Messrs. Capitan, Breuil and Peyronny have examined the Bernifal cave and found it the fourth cave of that neighborhood which shows mural decorations. There are three connected chambers about 250 feet long, and in the second, under a thick coating of stalagmites, occur twelve groups of figures amounting in all to thirty-six carvings. There are heads of reindeer and wild goat, an antelope with a head resembling the saiga now living in Northern Siberia, a bison or aurochs, very true to the life; a little horse like the wild horse found in Mongolia by Prejevalski, and several mammoths with long, curving tusks, high foreheads, and a covering of tufted heavy hair, like the specimen recently obtained entire from the frozen tundras of Northern Siberia. A puzzle is the frequent recurrence of triangles, even on the flanks of the animals represented. They are supposed to represent huts or tents, and perhaps signify that the beasts have been marked as the property of the tribe or totem-kin to which the cave belonged. A reason for this very serious artistic effort on the part of prehistoric men in Southern France, an effort which men in such a stage would not make from æsthetic instinct or for their pleasure in art, has been given as follows, by Hamy: Carving these wild beasts on the rock, they imagined that they were bound to them by magic, so that when they sallied forth to hunt, the game would be unable to escape. This is supposed to account for the drawings with which the African bushmen and the Australian black fellows decorate certain caves. One of the huts more elaborately carved seems to consist of skins and turf heaped on a framework of wood — in all probability one of those half subterranean dwellings that are known in Western Asia and also on the northwest coast of America. — *N. Y. Times.*

GUATEMALA CATHEDRAL. — The old churches in Central America are, or are intended to be, in the Italian style. Guatemala Cathedral is the only correct and fine church in the country. It was built by an Italian architect in the last century, after the destruction of the cathedral of Old Guatemala by an earthquake. In general correctness of style it is perhaps equal to St. Paul's Cathedral, London; and the churches generally are nearly as good as provincial churches in Italy. This cathedral is perhaps about 300 feet long. There is a lady chapel east of the high altar with an apsidal end. The nave, which is about 35 feet wide and 40 to 45 feet high, has double aisles, each 15 to 20 feet wide, north and south clerestory and transepts, or quasi-transepts with chapels. The walls are of great thickness and the windows rather small for the size of the building, which has a gloomy appearance. The window frames are of wood, and do not open sufficiently to ventilate the buildings properly. The orientation of the churches generally is correct or nearly so; and the principal entrance almost always in the west front or portico. Guatemala Cathedral has a dome over the choir. The other churches generally have a kind of dome or dome-covered tower. It has a good peal of deep-toned bells; and the organs, clocks and bells generally are good, and of Spanish manufacture. The roofs, both of the naves and aisles, are plain semicircular stone vaults, covered externally with stucco or cement; there is no timber, lead or slate used. — *The Architect.*

PIETRO TORRIGIANO, SCULPTOR. — A bronze bust in relief by Pietro Torrigiano, the sculptor who boasted to Benvenuto Cellini that he had broken Michael Angelo's nose for teasing him when they were boys together in the Medici Gardens at Florence, has been placed in Henry VII's Chapel, Abbey of Westminster. Torrigiano went to France and England; but he is better known by the slashing method he adopted to remodel Michael Angelo's nose than by the bronze tomb of Henry VII. The relief is a portrait of Thomas Lovell, K. G., Chancellor of the Exchequer, Speaker of the House of Commons, and High Steward of the Universities of Oxford and Cambridge. He was executor of the estates of Henry VII and Lady Mary Tudor, his mother. He died in 1524. Torrigiano is spoken of in the State papers of Henry VIII as "Peter Torrisany of the City of Florence." Beside the bronze tomb of Henry VII, which was finished about 1519, ten years after the King's death, Torrigiano made the monument to Dr. John Young in the Rolls Court, Chancery Lane, and a portrait round in plaster of Henry VIII at Hampton Court. Lovell is shown as a man with pronouncedly firm features, massive chin, and stern mouth. The insignia of the Garter has been used as a decorative adjunct to the quaint headgear of the period. A modern frame ornamented with Tudor roses incloses the relief. It was made for the archway above the entrance to a manor-house built by Thomas Lovell in the County of Norfolk. — *N. Y. Times.*

INTERNATIONAL EXHIBITION REPORTS. — The reports of the juries for the Great Exhibition of 1851 in Hyde Park formed a single volume. Although containing some valuable information, it was not appreciated, and copies may now be obtained for a shilling or less. Afterwards an illustrated catalogue came out in four volumes. For all the international exhibitions held since 1851 reports were prepared, and their voluminousness has increased as time advanced. The reports on the Paris Exhibition by French experts will comprise fifty-two octavo volumes of about 600 pages each. Six of them are the work of M. Picard, the Commissary general. It was arranged that the volume on "Painting" was to be produced by M. Larroumet, the Secretary of the Academy of Fine-Arts. Owing to illness he was compelled to decline the task. Eventually it was undertaken by M. Dubufe, the painter, and it was completed a few days ago. The series is ended, and can be printed. — *The Architect.*

THE IRON PILLAR OF DELHI. — The famous iron pillar of Delhi, India, is a solid shaft of wrought-iron, 16 inches in diameter, and of a length that is variously reported. The total height above ground is 22 feet, including a capital of 3¼ feet. Major G. A. Cunningham, R. E., C. S. I., Director-general of the Archæological Survey of India, reported in 1863 that the total length of the pillar is upward of 48 feet, and possibly 60 feet. The lower diameter is 16.4 inches and the upper diameter 13.5 inches. The pillar contains about 80 cubic feet of metal and weighs about seventeen tons. The metal was for a long time reputed to be bronze, owing probably to a curious yellowish shade on the upper part. A sample from near the base was analyzed by Dr. Murray Thompson, and found to be pure malleable iron of 7.66 specific gravity. The metal is, of course, charcoal iron, made directly from the ore in small billets; but how it was welded up no one can tell, as no record exists of any early method of dealing with great masses of wrought-iron. An inscription, roughly cut or punched upon the column, states that Rajah Dhara subdued a people in the Surdhu, named Vahlikos, and obtained with his own arm an undivided sovereignty on the earth for a long period. The date of the inscription has been referred to the third or fourth century after Christ, but on this authorities are at variance, as the style of writing is supposed by some to belong to a later period. According to tradition, the iron pillar was erected by Bilan Deo, the founder of the Tomara dynasty, who was assured by a learned Brahmin that, as a part of the pillar had been driven so deep into the ground that it rested on the head of Vasuki, King of Serpents, who supports the earth, it was now immovable, and that dominion would remain in his family as long as the pillar stood. The rajah, doubting the truth of the Brahmin's statement, ordered the pillar to be dug up, when the foot was found to be wet with the blood of the serpent king. The pillar was again raised, but, owing to the rajah's incredulity, no means could be found to fix it firmly, and it remained loose (dhila) in the ground, and this is said to have been the origin of the name of the ancient city of Delhi. — *Cassier's Magazine.*

A BOAT OF RE-ENFORCED CONCRETE HALF A CENTURY OLD. — The idea of increasing the resistance of masonry by iron cramps is very old. With the development of the cement industry, and its sister industry of artificial stone-making, at the beginning of the last century, in England and France, the necessity of reënforcing concrete forms by iron wires became apparent. The knowledge of utilizing iron wire for this purpose can be considered as having been quite general in 1850. The Patent Letters of J. L. Lambot, of Carces, France, issued in 1855, contain the idea of replacing timber in shipbuilding by reënforced concrete plates made of mortar laid on a core of iron netting. A boat was built of this material by Malot and exhibited at the World's Exhibition of 1855. It is still in active service on an estate in France. It is this boat and not the legendary flower-pots ascribed to Monier which represents the first application of reënforced concrete known up to the present time in which the methods and advantages of this type of construction were made public. It is of great interest, as it furnishes a rare proof of the durability of concrete almost half a century old. The subject of building ships of this material was at that time quite seriously considered, and it is not surprising that the Marine Department of Toulon, in a report dated November 5, 1855, expressed itself against the idea. Recent experiences, however, with many applications which were condemned in their time, but which finally triumphed, as, for instance, railroad ties of reënforced concrete, may serve as warnings against the final disposal of the subject. — *Stone Trades Journal.*

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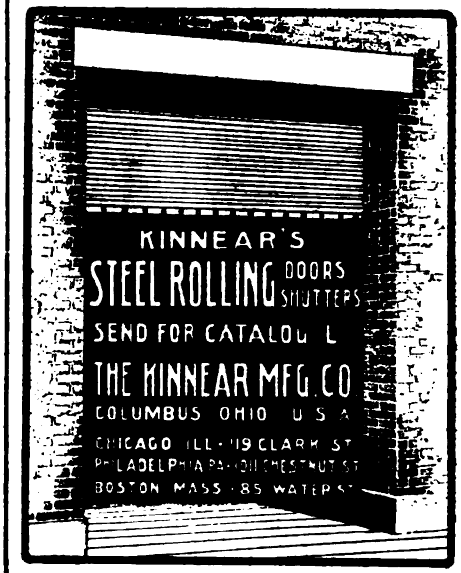

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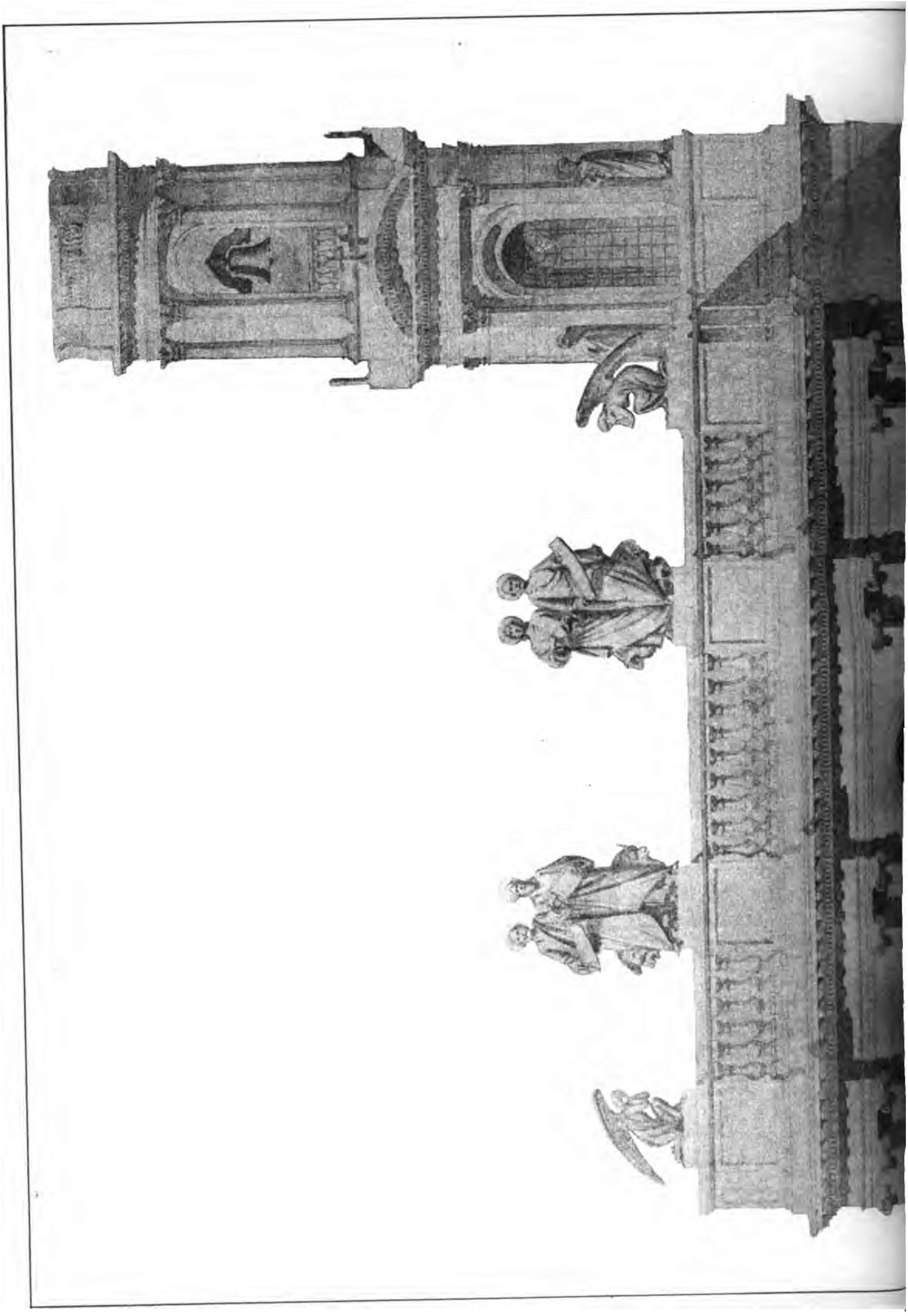

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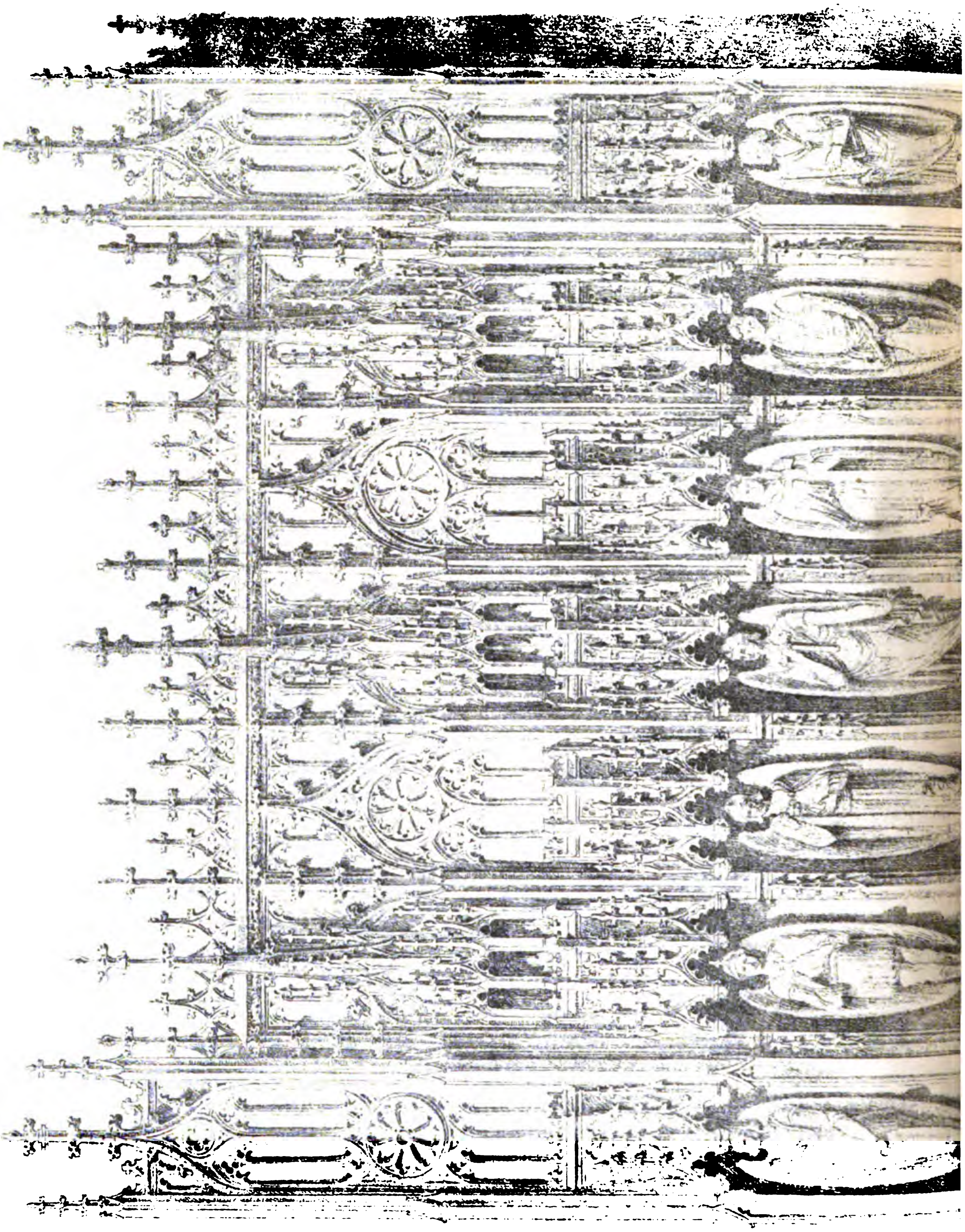

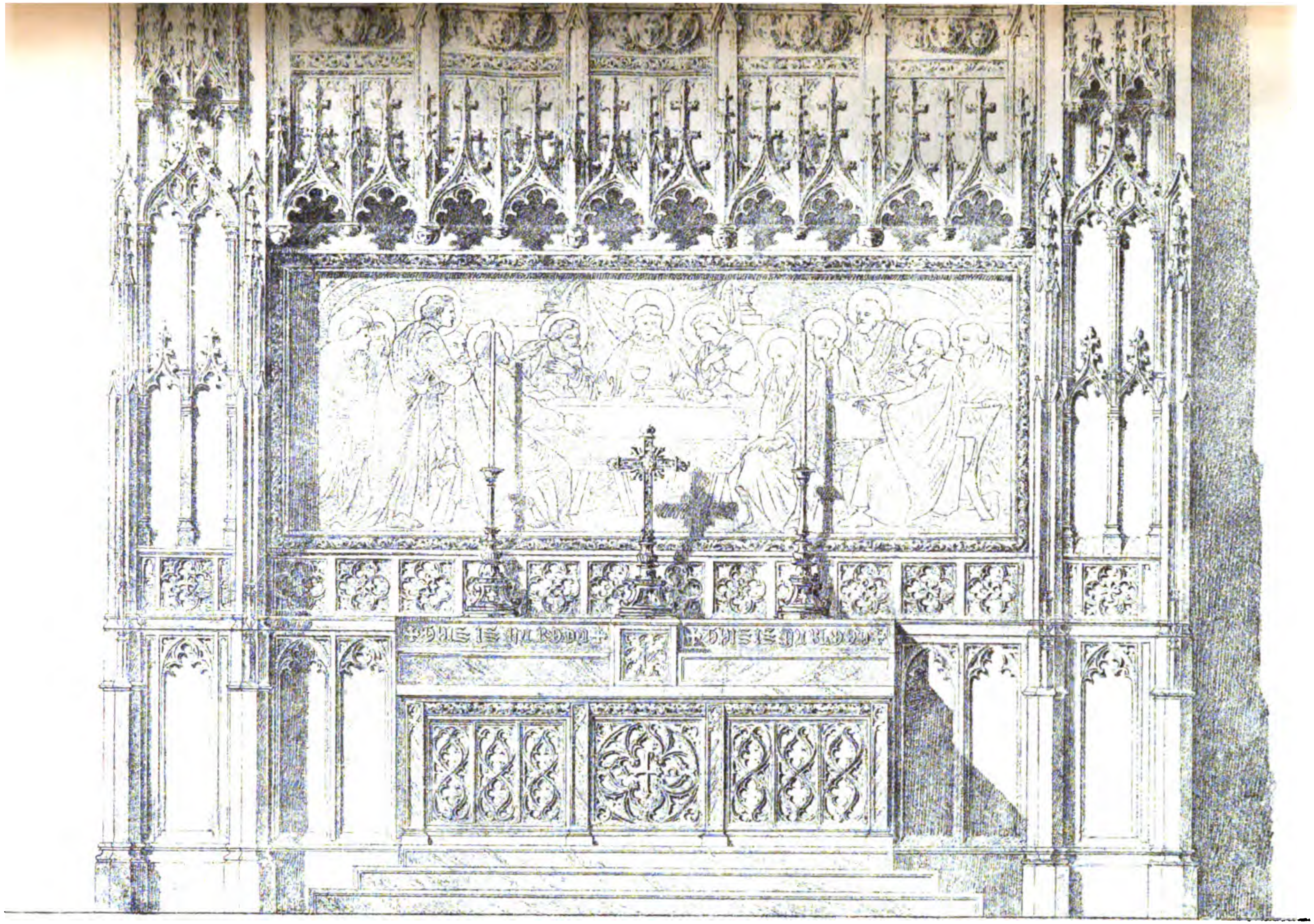

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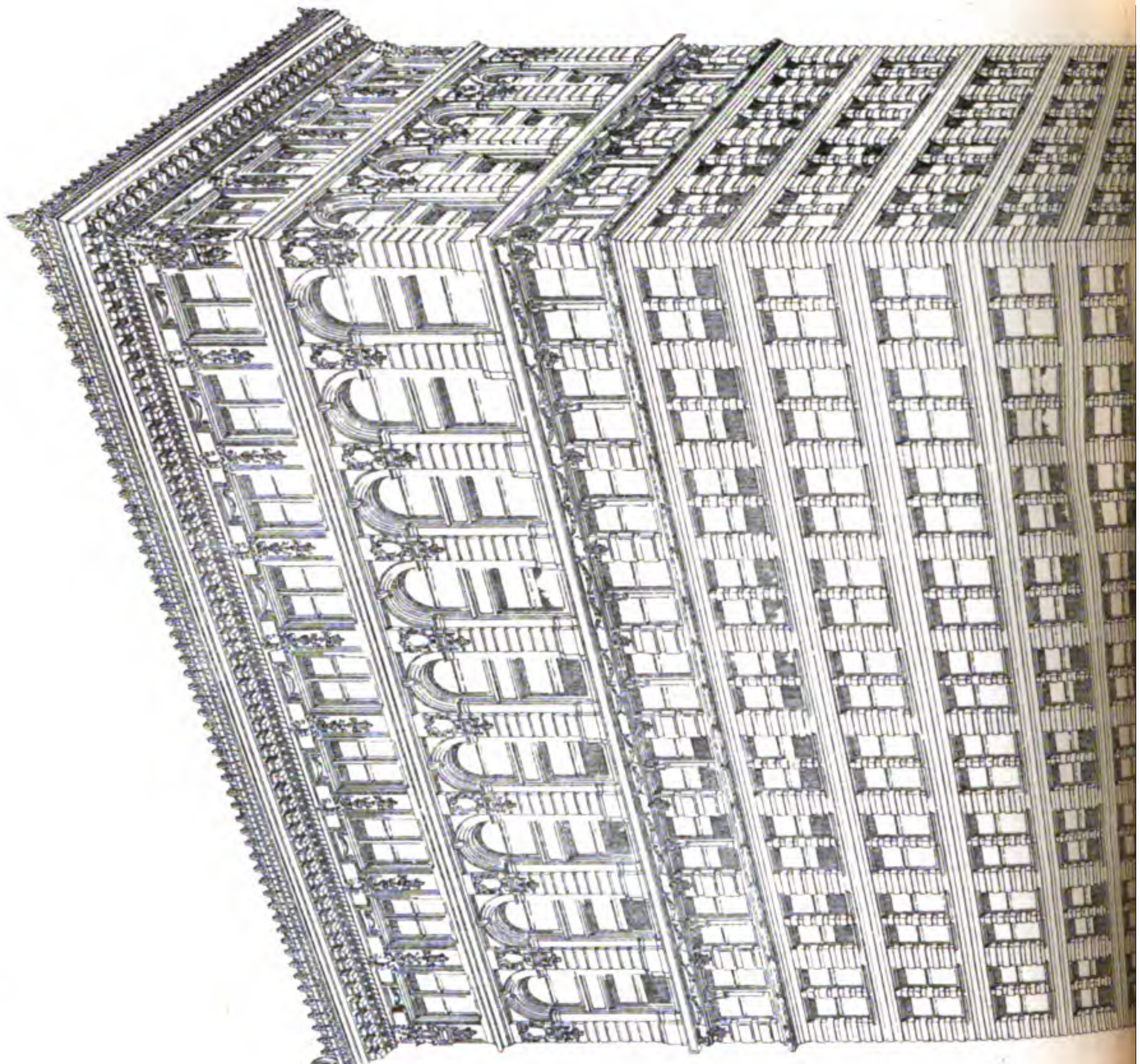

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THE AMERICAN ARCHITECT AND BUILDING NEWS

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CONTENTS

MANY of our readers will hear with great regret of the death of Mr. George F. Shepley, at St. Moritz, in the Engadine. Mr. Shepley was born in St. Louis, in 1860, of a distinguished family, his father having been one of the most brilliant lawyers in the city. The younger Shepley received his professional education in Boston, graduating from the Massachusetts Institute of Technology in 1882. With his classmate, and future partner, Mr. Charles A. Coolidge, he entered, immediately after graduation, the office of the late H. H. Richardson. On the death of the latter Mr. Shepley and Mr. Coolidge, with Mr. Rutan, who had also been for many years connected with the same office, continued, in accordance with Mr. Richardson's formal wish, the business which he left unfinished, and soon acquired for themselves a high reputation, carrying out a large number of important works. Among these the best known are the Ames Building in Boston; the North Union Railway Station, in Boston, one of the most beautiful railroad buildings in existence; the South Terminal Station, the largest railway station in the world; the Hartford Station; the buildings of the Leland Stanford University, in California; the Art Institute and the Public Library, in Chicago; the Congregational House, in Boston; the Union Station, in Albany, and many private residences and mercantile buildings. Mr. Shepley, who married Mr. Richardson's daughter, was peculiarly identified with the work of that great artist, and the Galilee porch which was added to Trinity Church, in Boston, some years ago, is quite worthy of the building.

MR. SHEPLEY'S health had always been delicate and the labor and anxiety of professional life severely tried his constitution. For a time he found it necessary to spend a part of the winter months in the dry climate of Switzerland, usually in the Engadine; but this condition seemed to pass away, and he had been able for some years to endure the winters at home, until, in January last, the appearance of grave symptoms made it necessary for him to leave his work and seek again the mountain air of Switzerland, unfortunately without benefit. Mr. Shepley was always deeply interested in professional matters, and was prominent among the Directors of the American Institute of Architects, so that he was very well known in professional circles throughout the country, and was universally beloved for his quiet courtesy. His work reflected the refinement and delicacy of his character, and, although he had to struggle constantly against physical weakness, few architects have been able to impress themselves more thoroughly upon their buildings, and his early death is a loss to American art, as well as to the profession.

ARCHITECTS will be interested to learn something, outside of the circulars so liberally sent them by rival manufacturers, concerning the relative merits of white lead and zinc as pigments for painting in oil. It is hardly necessary to say that white lead causes, in those who use it, serious poisoning, and many attempts have been made to substitute something else for it, particularly for inside work. It is only justice to say that these attempts have been, to a great extent, defeated, at least in this country, by the unconscionable adulteration of all white pigments. An architect who studies the effect of a material, branded, on the barrels containing it, as "Warranted Strictly Pure White Lead," which does not contain even a trace of white lead, and compares it with some "Warranted Pure Zinc White" which does not contain a trace of zinc, may be excused for failure to form a distinct idea of the relative merits of the two materials; and the common notion, or superstition, that real white lead and linseed oil enter into a mysterious but beneficent combination, has had much to do with influencing architects to prefer the use of lead. According to M. J. L. Bréton, of the French Academy of Sciences, the idea of chemical union between linseed oil and white lead is an erroneous one. Nothing but a mechanical mixture is, or can be, formed between the two substances, and he says that the mixture of oxide of zinc with linseed oil is more homogeneous than that formed with white lead. Zinc requires the addition of much more dryer to the oil, but this does not appear to injure its solidity; and it is curious that, contrary to the common notion, oxide of zinc has, weight for weight, nearly twice as much covering power as lead, when mixed with the same quantity of oil, and even volume for volume the covering power of zinc is about a third greater than that of lead. The oxide of zinc, however, when mixed with oil, gives a much less fluid paint than an equal volume of white lead; so that the apparent deficiency in covering power of zinc paint, which every architect has observed, does not come from any inherent quality of the material, but from the fact that the painters, in mixing zinc, thin it to the usual consistency of lead paint, thus forming a mixture which is nearly all oil. With care to use zinc paint much thicker than lead, and to put in plenty of dryer, it will, according to M. Bréton, cover as well as lead, and adhere even more strongly, besides resisting the action of sulphurous gases, which soon affect lead paint in interiors; and its advantage over lead in not being poisonous is so great that humanity suggests its use wherever practicable.

THE new *Times* building, in New York, offers some novel problems in construction. It is to be not only some twenty stories high above the street, but is to have three stories underground, the floor of the press-room being fifty-five feet below the curb. In addition to this, the city subway is to run through it, twenty-two feet below the curb; so that the press-room and composing-rooms will have a railroad above them. This feature is, however, regarded as advantageous, on account of the facilities which the subway will afford for distributing the various editions of the paper. Ventilation for the basement stories is to be secured by means of a shaft for supplying fresh air, while foul air is exhausted by a shaft, through the middle of which runs the main smoke-stack.

WE may be pardoned for recalling our prediction that the progress of the art of navigating the air would have serious significance, not only in connection with military matters, but as affecting international tariffs. Although M. Santos-Dumont and the managers of the Lebaudy air-ship sail about Paris almost daily, steering in any direction, at pleasure, and, in the case of the Lebaudy balloon without, apparently, concerning themselves about the force or direction of the wind, the military authorities of this country, which has the most, perhaps, to gain by the utilization of the new art, seem as indifferent as those of other nations to the impending transformation of offensive and defensive methods; but the octroi officials of Paris are said to be immersed in deep thought over the future. It will be a long time yet before barrels of lime, or bags of potatoes, or loads of hay, are carried through the air across the Parisian barriers; but the collectors of the octroi do not propose to be taken by surprise when the time arrives. Meanwhile, it is unnecessary to point out, as we have so often pointed out before, that a machine which, like the Lebaudy air-ship, can take four men; or a quarter of a ton of

high explosives; or fifteen million dollars' worth of diamonds; or a proportionate value in laces, or silks, or other highly-protected, but light fabrics, and sail with them in any direction, even against a strong wind, at the rate of twenty miles an hour, landing, and returning to its starting-place, is an engine with which custom-house officers and military men will soon have to reckon seriously.

THE last act of the comedy of the tiara of Saïtapharnes seems to have been played. M. Clermont-Ganneau, the expert appointed by the authorities of the Louvre to examine it, and to make inquiry into its authenticity, has reported his conclusions at great length, summing them up in the simple words, "The golden tiara of the Louvre is a forgery; it was executed under the direction of a certain X . . . , by a modern artist; that artist is M. Rochumowski." The Rochumowski mentioned is a goldsmith from Odessa. According to his story, a certain M. X . . . , whose real name will be guessed by many of our readers, although the official report conceals it, came to him, not long ago, with four bits of gold, in miserable condition, and told him that he wished them to be used as suggestions for the construction of a tiara, in antique style, which was to be presented, as a gift of honor, to a distinguished professor of archæology in the University of Kharkov, on the occasion of his jubilee. Rochumowski, in accordance with these directions, and under the guidance of M. X . . . , made the tiara, in three pieces, which, after many alterations, were approved and soldered together. The tiara was duly delivered to M. X . . . in finished condition, together with the fragments which he had brought as a model, a single one of these fragments, only, having been incorporated in the new work. M. X . . . then disappeared with his tiara, but circumstances seem to have interfered with presenting it to the worthy professor at Kharkov, for it next turned up, in a dirty and battered condition, as a genuine antique, dug from a grave in ancient Scythia. It is unnecessary to repeat the account of its rejection by the authorities of various museums, its final purchase by the Louvre, for the sum of forty thousand dollars, and the controversies which have been going on over it ever since; but the story of the inquiry into the truth of Rochumowski's testimony is interesting. On being promised, as he requested, payment of his expenses in coming to Paris to prove the falsity of the tiara, he sent photographs of the tiara, taken while it was still in his hands, together with tracings of the drawings which he had used for making the decorations, transferring them to the gold by following the outlines with a small punch. The tracings were applied to the ornamented bands of the tiara by M. Clermont-Ganneau, and found to "fit like a glove"; and the marks of the punch were still to be seen. Rochumowski also said, without seeing the tiara, that the hand of one of a figure of Achilles, in one of the groups, would be found in much higher relief than the rest of the figure; and that, in the left thigh of a figure of Antilochus, was a small fissure in the metal. Both these places were examined, and Rochumowski's description found to be correct. Besides these, and other proofs, he showed the tool with which he made the beading around the bands of decoration. This made five beads at a time, and the work was found to correspond with the tool.

IT is impossible to resist the evidence of these indications, and we can only wonder at the grossness of the forgery, and the ease with which it was imposed upon the learned world. On being asked asked where he got the designs for his "Scythian warriors" and other personages, Rochumowski, who is not an educated man, and had only a vague recollection of books, gave a description which enabled the experts to fix upon a work on the "Antiquities of Southern Russia," by Tolstoi and Kondakoff, and a popular Atlas of the World by Weisser. The tracings which Rochumowski made from the Atlas were numbered to correspond with the plates, so that they were easily compared with the original book, and the very distortions of Weisser's rude drawings were found to be reproduced on the tiara. Even worse than this, one of the Weisser plates used by the goldsmith to copy his Scythian war-scenes from represented Giulio Romano's fresco of the victory of Constantine over Maxentius. Another curious circumstance about the affair is that Rochumowski says that the fragments shown him by M. X . . . as models were not only very clumsily executed, but were in parts unfinished. It is conceivable that fragments of genuine antique work might be coarsely executed, but it is difficult to believe that even a Scythian king would have been buried with a crown composed of incomplete fragments; and, although, as Rochumowski says, the bits of gold showed great damage from age, it is not unreasonable to suppose that the ingenious M. X . . . might have played his first little deception, for practice, on Rochumowski himself, exhibiting, as M. Planat suggests, as antique fragments, bits of work which other goldsmiths had made for him on trial, and which, proving unsatisfactory, he had transformed into antiquities by familiar means.

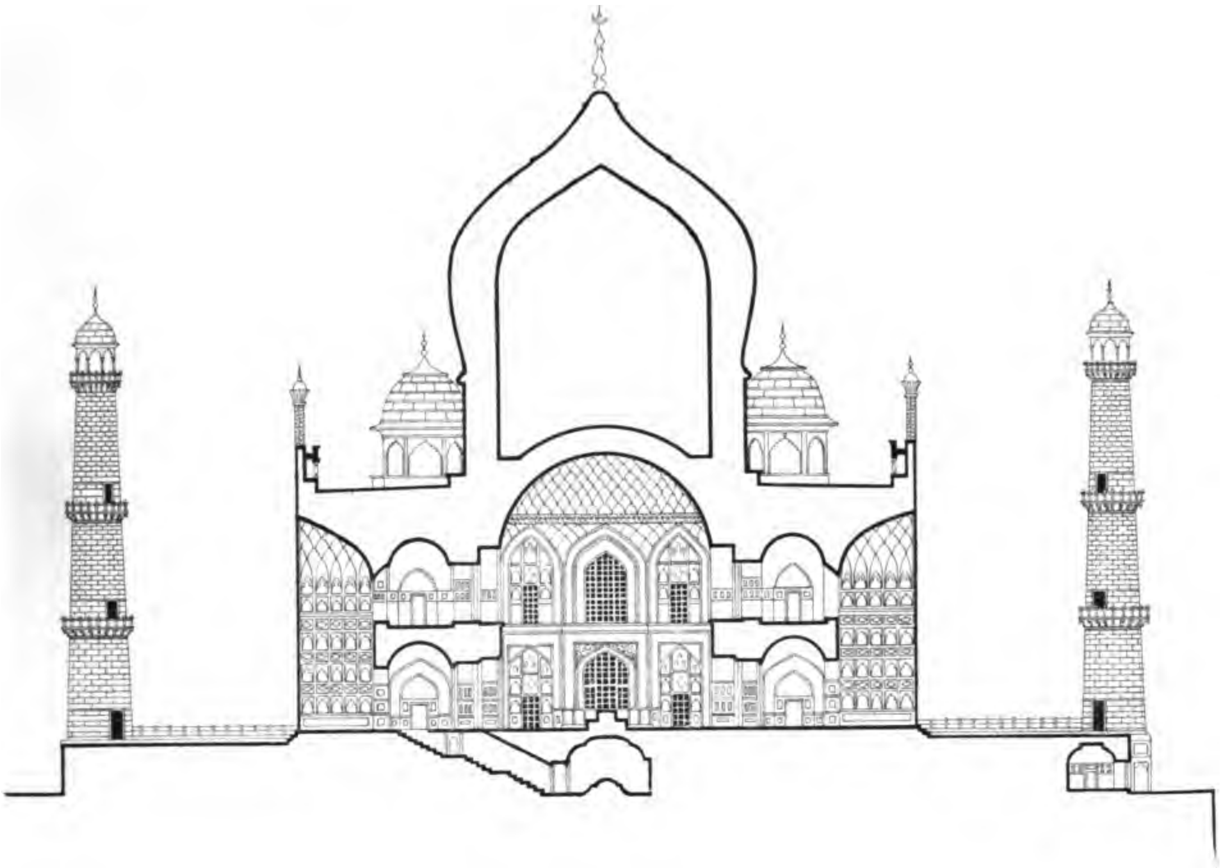
THE statistics recently published by the international Postal Bureau at Berne are curious. As might be expected, the United States leads all other countries in number of post-offices, possessing seventy-eight thousand. Germany comes next, with forty-six thousand, while Great Britain has only twenty-two thousand. It is, however, to be remembered that, in Europe, rural free delivery is almost universal, so that the multiplication of small post-offices is unnecessary. A greater number of officials is, however, required; so that Germany, with less than three-fifths as many post-offices as the United States, employs more men to carry them on, the number being two hundred and thirty-three thousand for Germany, to two hundred and twenty-seven thousand for the United States. France is, in comparison with Germany, poorly supplied with post-offices, having only eleven thousand, employing seventy-seven thousand officials, while even British India has fourteen thousand post-offices. Russia, where only one person in four can read or write, has, naturally, little use for post-offices, and only sixty-two hundred are found in the country; while resolute little Japan, the intellectual wonder of the age, has forty-five hundred. Austria and Italy have about the same number, conditions being, apparently, nearly alike in the two countries.

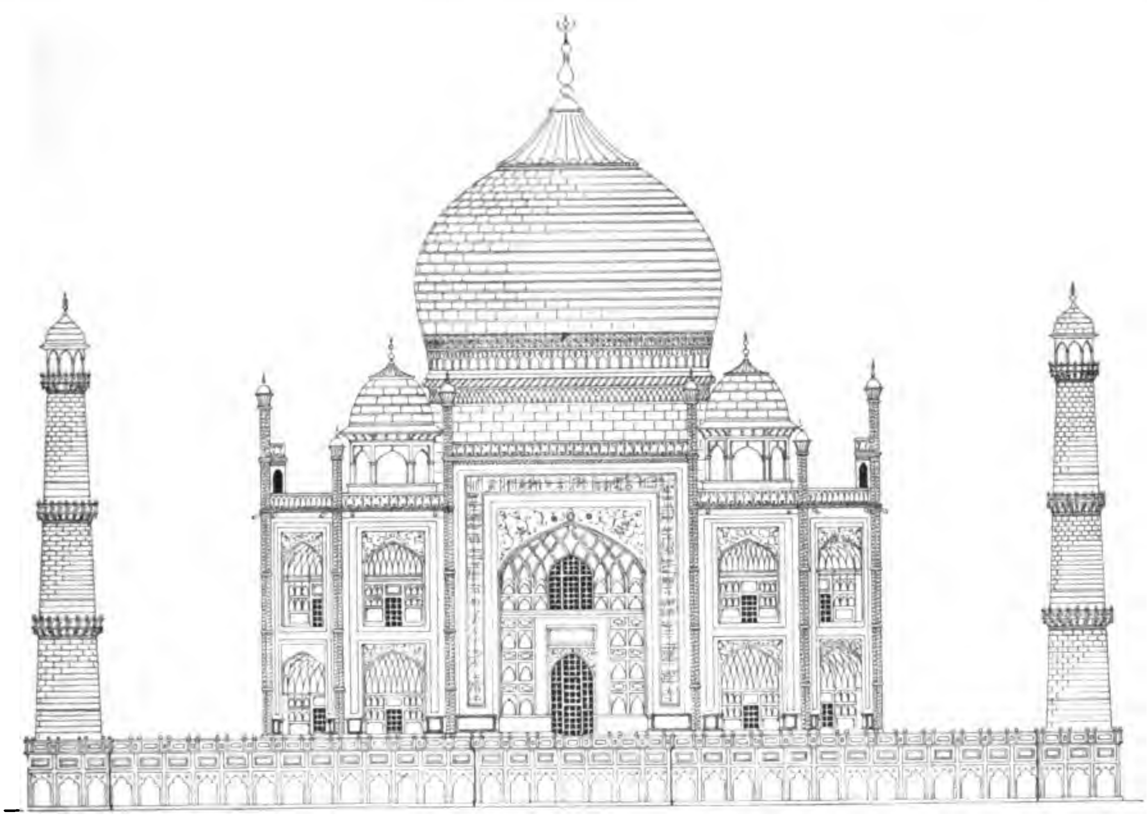
IT is reported in the foreign papers that "an American syndicate" has made a proposition to the Russian Government to build the proposed ship-canal from the Baltic to the Black Sea, a distance of more than a thousand miles, and to have it completed in five years, for the sum of one hundred and sixty million dollars. This is less than one-third of the cost originally estimated, and it seems not improbable that the proposition will be accepted. The canal, according to the route now determined upon, will start from Riga, on the Baltic, and follow the course of the river Dwina to the city of Dünaburg; thence it is cut for about a hundred miles in a straight line to the Beresina River, which it follows to its confluence with the Dnieper, continuing down the Dnieper to its outlet in the Black Sea, near Odessa. It thus follows, for more than nine-tenths of the way, existing water-courses, some of which are already navigable; but it will be necessary to deepen all of them materially, in order to accommodate the war-ships which the Russian Government wishes to send through the canal.

WE heard once of an architect who, after being questioned by his client on a great variety of artistic and scientific matters, was requested to compose a prescription for a sick horse; and it may be assumed that architects, like lawyers, find use, sooner or later, for all the knowledge that they can acquire, in any department of learning. It will, therefore, perhaps do them no harm to remember a new test for milk, which has recently been devised by Dr. Parmentier, a Parisian hospital physician, and has been applied with great success for detecting fraud in milk supplied to the various hospitals and day-nurseries of the city. This test, which is easily applied, consists simply in freezing the milk, and noting the temperature at which congelation takes place. Pure milk freezes at a temperature varying from —.55° to —.57° Centigrade. If it is found to freeze at a higher temperature, water has been added to it. If it remains liquid at a temperature below —.57°, this indicates that the milk is sour, or that some preservative substance, like boric acid, has been added to it. Dr. Parmentier, in applying this test, has made what he calls "distressing discoveries" in regard to the milk supplied to the sick people and babies in public institutions. Dilution with from five to ten per cent of water, is, he says "habitual," and the adulteration very often reaches much larger proportions. In his opinion, this form of fraud plays a great part in the production of infantile enteritis, and constitutes a virtual poisoning.

THE TAJ AND ITS DESIGNERS.[1]

ALL who have seen the great masterpiece of Indian architecture, the Taj at Agra, or know it by illustration and description, are familiar with the legends which ascribe its conception to the genius of some obscure Italian architect, and its exquisite inlaid decoration to Austin de Bordeaux, a French adventurer, who was employed for some years at the court of Shah Jehan. The readiness with which the tradition has been accepted as history by European writers is comprehensible, for every European who gazes at the ethereal beauty of the Taj must feel some pride if he can bring himself to believe that the crowning glory of one of the most brilliant epochs of Indian art owed its inspiration to Western minds. Nevertheless, it must be confessed that the credence generally given to this vague romance does more credit to our imagination than to our historical sense, or artistic judgment. Indian art is still very little understood by Europeans. We feel and admire the decorative element in it, but deny to it higher imaginative qualities. The Indian art which we know and understand best is the least important part of it. It only comprises those accessories of Indian domestic life which, however beautiful they may sometimes be, lose all their artistic significance when detached from the surroundings for which they are intended, and invariably suffer artistically from the interest we take in them. We have been unable to follow the trend of Indian artistic thought beyond this decorative constituent quality, because





The Taj Mahal, Agra, India.

[1] We have added to Mr. E. B. Havell's interesting paper, published in the *Nineteenth Century* for June, illustrations drawn from divers sources, which, we believe, will enhance its value. — EDS.

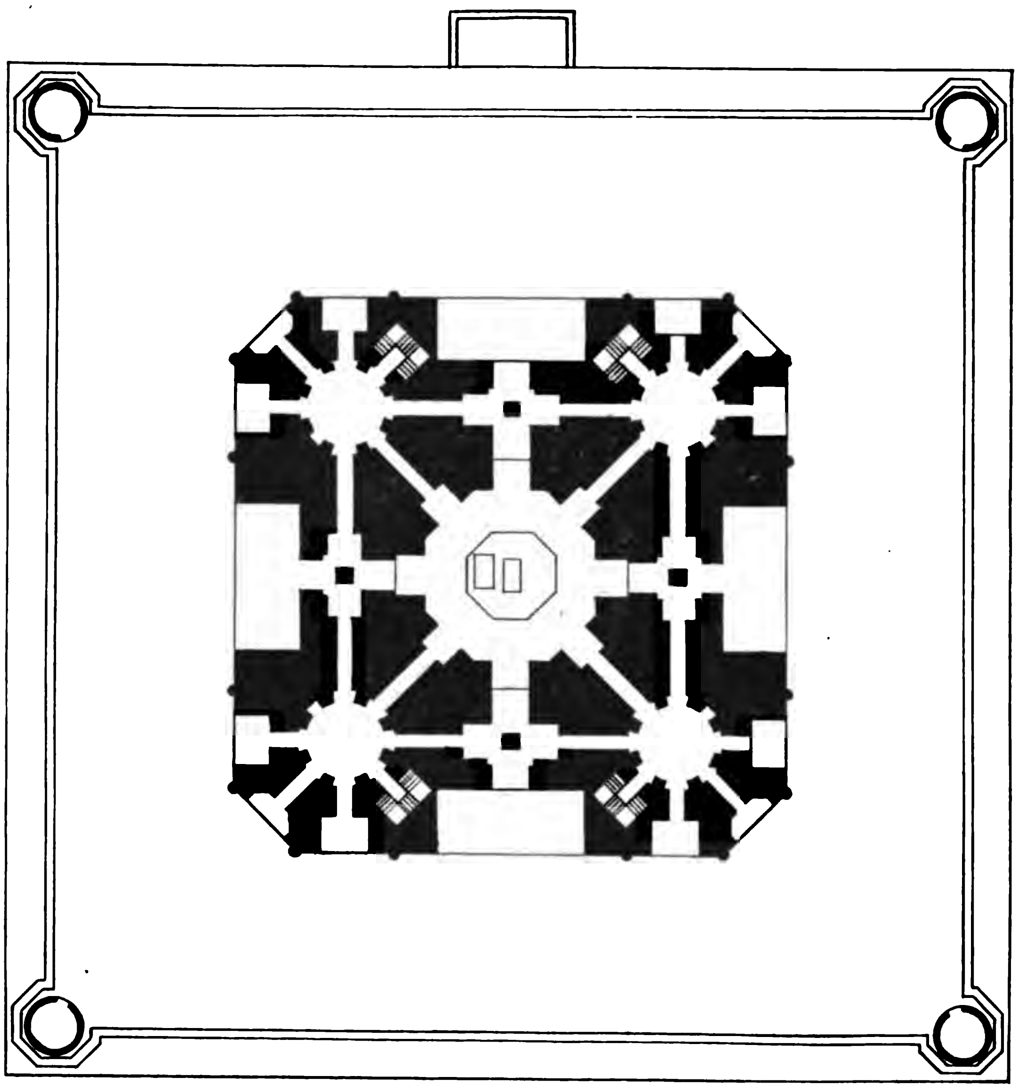
from this point it becomes much more abstract and abstruse than our own. And no one will ever get farther in his understanding and appreciation of Indian art without forsaking that stolid attitude of ignorant condescension with which the ordinary European, and more especially the Anglo-Saxon, treats everything Oriental which he does not understand. If, throwing aside preconceived notions and insular prejudices, we approach Indian art with the same spirit as animated the European pioneers of Sanscrit research, we shall like them find ourselves revelling in new fields of wonder and beauty, the fairyland of Eastern romance and poetry. We shall then see how ridiculous we, and the educated Indians who follow our example, make ourselves by importing European pictures and sculpture in the belief that we are thereby throwing a flood of Western light upon the darkness of the East. The spirituality of Indian art permeates the whole of it, but it shines brightest at the point where we cease to see and understand it.

If India has not produced a Phidias or a Raphael, it has created the most imaginative architecture in the world. Such painting and sculpture as there have been in Indian art are nearly always strictly subordinated to the architectural idea; they never detached themselves or degenerated into drawing-room accessories, as we now understand the "fine-arts." Everything connected with the history of the Taj is important to the student of Indian art, for the Taj is the consummation of a great artistic development, the traditions of which remain alive even at the present day. The truth or otherwise of the legends I have referred to is of cardinal importance, for if it be accepted that an Italian or French artist designed the masterpiece of the Mogol epoch, there would be much force in the theory that the Indian requires the aid of a higher Western intelligence to perfect his artistic ideas. Let us then consider carefully the historical and artistic grounds on which these traditions rest. The circumstances which led to the building of the Taj are well known and need not be given in detail. The death in childbed of Mumtaz Mahal, "the Crown of the Palace," Shah Jehan's favorite wife in A. D. 1629; the distracted grief of the Emperor, and his resolve to build her a monument which should be one of the wonders of the world. He sent for all the best architects of his empire, in consultation with whom he inspected and rejected many hundreds of designs. At last one design was accepted, a model of it was made in wood, nd fr om this model the Taj was built.

So far all accounts agree. But as to the name of the architect selected we have, on the one hand, the unanimous statement of contemporary Indian writers, and on the other a story related by a Spanish priest, Father Manrique, who visited Agra ten years after the Taj was begun. The former agree that the design was made by Ustad Isa, a celebrated architect who, according to one account (preserved in the Imperial Library, Calcutta), came from Shiraz, and according to others, from *Rum*, which may mean either Constantinople or some part of Asiatic Turkey. The style of the Taj points to the probability that his native place was Shiraz, though it is quite possible that he may have been employed by the Sultan of Turkey at Constantinople. Father Manrique in his description of the Taj, then under construction, relates the following story, told to him by Father Da Castro of Lahore, who was the executor of the obscure Italian who thus claimed to have designed the Taj: —

The architect was a Venetian, named Geronimo Verroneo, who came to India with the ships of the Portuguese, and who died at Lahore a little before my arrival. Of him a report was current that the Padsha, having sent for him and made known to him the desire he felt to build there [at Agra] a sumptuous and grandiose monument to his defunct consort, the architect Verroneo obeyed, and in a few days produced various models of very fine architecture, showing all the skill of his art; also that, having contented his Majesty in this, he dissatisfied him, according to his barbarous and arrogant pride, by the modesty of his estimates; further that, growing angry, he ordered him to spend three krors,[1] and to let him know when they were spent.

Now in estimating the comparative historical value of these two versions it must be allowed that the absence of any mention of Verroneo in the contemporary Indian accounts does not necessarily discredit his story, for it is well known that Mohammedan writers often omitted from their works any facts which might bring honor to their religious opponents. On the other hand, Verroneo's story contains so many of the wildest improbabilities that it is extraordinary that Anglo-Indian writers should have accepted it with so little hesitation. In the first place it is necessary to consider that in the



Plan of the Taj Mahal, Agra, India.

[1] A kror is 100 lacs of rupees, so that the appropriation about equalled $14,400,000. — EDS.

type of adventurers "who came with the ships of the Portuguese" to India in the seventeenth century and entered the service of the Great Mogol, one would not expect to find the transcendent artistic genius such as the designer of the Taj possessed. Bernier, the French physician, who resided several years at the Mogol court during the reign of Aurungzebe, incidentally throws a sidelight on their character in his description of the famous Peacock Throne, a part of which was designed by a Frenchman (supposed to be Austin de Bordeaux) who, "having circumvented many Princes of Europe with his false gems, which he knew to make admirably well, fled to the Mogol court where he made his fortune." Verroneo seems to have been less successful in the latter respect, but he certainly contrived to emulate Austin in making for himself a fictitious fame, which has lasted to the present day. At the time when the Taj was built the position of the Franks, as Europeans were called, was by no means what it was in the days of Akbar and Jehangir, the two preceding emperors. They were mostly employed in the artillery or in the arsenals, and Bernier tells us that in his time they were admitted with difficulty into the service; and that, whereas formerly, when the Mogols were little skilled in the management of artillery, they received as much as two hundred rupees a month and upwards, their pay was now limited to thirty-two rupees. The Jesuits, who whose lifelong devotion to his wife was the strongest trait in his character, had chosen one of these hated unbelievers to be the chief designer of her monument. As a matter of fact Father Manrique's account is entirely uncorroborated by any other contemporary European writer. Neither Tavernier, who saw the commencement and completion of the Taj, nor Bernier, make any mention of Verroneo, or suggest that the building was in any way the work of a European. Bernier, in his description of it, expressly implies that he looked upon the Taj as a purely Indian conception, for he naïvely confesses that though he thought "that the extraordinary fabric could not be sufficiently admired," he would not have ventured to express his opinion if it had it not been shared in by his companion (Tavernier), for he feared that his taste might have been corrupted by his long residence in the Indies, and it was quite a relief to his mind to hear Tavernier say that he had seen nothing in Europe so bold and majestic. Thévenot, who saw the Taj in 1666, affirms that this superb monument is sufficient to show that the Indians are not ignorant of architecture; and though the style may appear curious to Europeans, it is in good taste, and though it is different from Greek or other ancient art, one can only say that it is very fine. The absence of any reference to Verroneo in the accounts of these three minute and impartial chroniclers of the Mogol times is very strong evidence

The Taj Mahal, Agra, India.

had enjoyed great favor under his father and grandfather, were bitterly persecuted by Shah Jehan. He deprived them of their pension, destroyed the church at Lahore and the greater part of that of Agra, demolishing a steeple which contained a clock heard in every part of the city. Only a short time before her death Mumtaz Mahal, who was a relentless enemy of the Christians, had instigated Shah Jehan to attack the Portuguese settlement at Hooghly. After a desperate resistance the Portuguese were overwhelmed. Two thousand, including women and children, took refuge on a warship and perished with the crew, as the captain blew up the vessel rather than surrender. Five hundred prisoners, among them some Jesuit priests, were sent to Agra. With threats of torture the Empress endeavored to persuade the priests to renounce their religion. On their refusal they were thrown into prison, but after some months they were released and deported to the main Portuguese settlement at Goa. Their books, pictures and images were destroyed by orders of Mumtaz Mahal. Her hatred for the Christians is perpetuated on her tomb in the mausoleum itself, which bears the significant inscription, "Defend us from the tribe of unbelievers!" From Bernier we learn that no Christian was allowed inside the mausoleum, lest its sanctity be profaned.

In the face of these facts it would require the very strongest corroboration of Verroneo's story to make it credible that Shah Jehan, that his story was partly or wholly a fabrication; otherwise it is impossible to believe that they would not have known and mentioned the fact that the chief architect was a European. Verroneo's finishing touch regarding the spending of "three krors" is in itself suspicious. If he really had been in such a position his fame would have been known far and wide among his fellow-Europeans, for it was only the highest nobles of the Court who were entrusted with the expenditure for the Great Mogol buildings. The *Badshah Nama* mentions the names of the two nobles who actually superintended the Taj, Makramat Khan and Mir Abdul Karim.

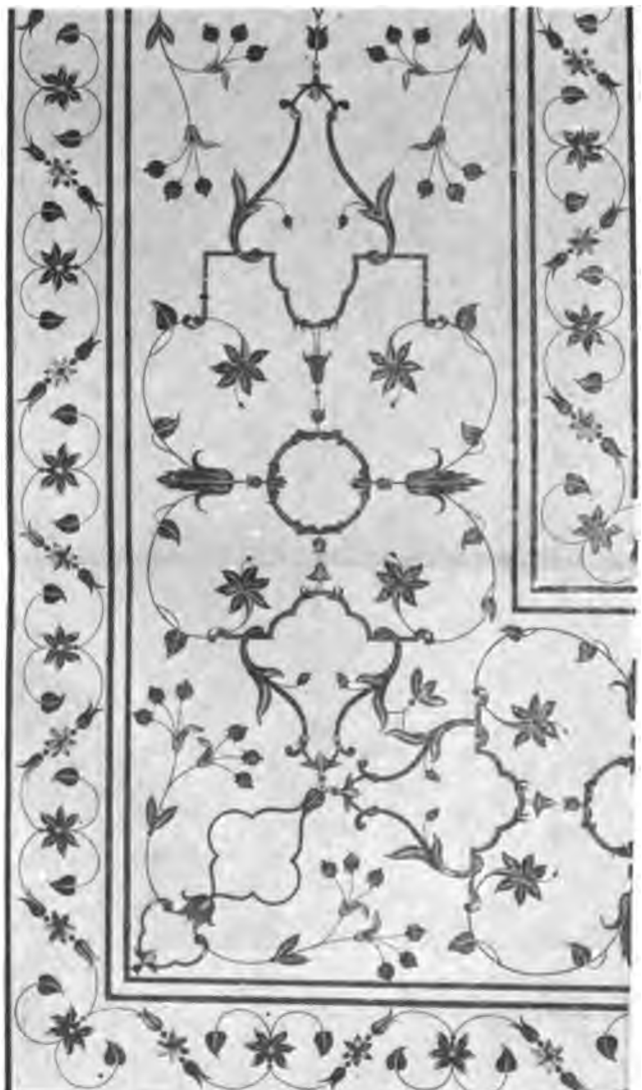
Father Manrique and the three writers I have mentioned are the only Europeans who have recorded contemporary knowledge of important facts connected with the Taj. It is unnecessary to refer to later accounts, borrowed more or less from them. While history affords practically no evidence in support of Verroneo's claim to immortal distinction, the Taj itself is the most convincing proof of the impudence of the assumption. The plan follows closely that of Humayni's Tomb, built by Akbar nearly a century earlier. Neither in general conception nor in the smallest detail does it suggest the style of the Italian Renaissance, which a Venetian architect of the seventeenth century would certainly have followed. If Verroneo's design had been executed we should doubtless have had some kind of Orientalized version of the church of Santa Maria della

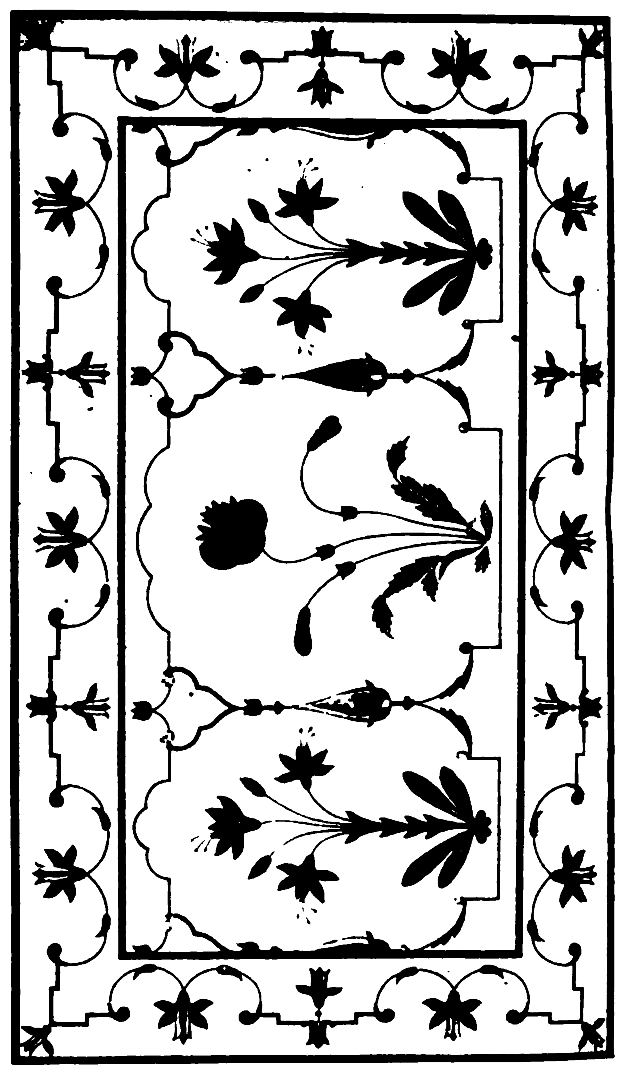
Salute of Venice instead of the Taj. It is inconceivable that Shah Jehan, a man of cultivated artistic taste, surrounded as he was by all the most accomplished architects of the East, would have engaged a European to design a building in a purely Eastern style.

The Indian records relating to the Taj are unusually precise and detailed in the information they give with regard to the architects and workmen. The artistic history of the period, and the style and workmanship of the Taj, all testify in a remarkable way to their accuracy and the falseness of the theory that Europeans directed the design of the building. The places given in the Calcutta Imperial Library manuscript as the native towns of the principal architects and decorators, namely, Shiraz, Baghdad and Samarkand, indicate precisely that part of Asia which was the cradle of the art represented by the Taj. The mention of Samarkand is especially interesting, for it is known that Tamerlane, after his invasion of India in A. D. 1398, carried off all the masons who had built the famous mosque at Ferozabad (since destroyed), in order that they might build another like it at Samarkand. Most probably they were the descendants of these masons who came back to India to build the Taj.

good deal of plausibility in the theory, though most authorities have been puzzled by the manifest inconsistencies which tell against it. The technical similarity of the inlay of the Taj to the *pietra dura* of the Medicean Chapel at Florence was noticed by Bernier, though he does not suggest any connection between the two. At the back of the throne chamber in the Dewan-i-am at Delhi there is a large piece of very realistic *pietra dura* work, undoubtedly Florentine in style. But, except for the silly chatter of native guides, who used to point out the panel of Orpheus as the portrait of Austin himself, there is not a vestige of historical evidence to connect him with it. Fergusson has shown that this panel (lately brought back from South Kensington and restored to its place by Lord Curzon) is a traditional Italian rendering of the classical story which can be traced back as far as to the catacombs at Rome. Sir George Birdwood, however, in his "*Industrial Arts of India*," accepts the theory that Austin was responsible for the Taj decorations, as well as for the *pietra dura* work at Delhi, though in a latter article in the *Journal of Indian Art* he says that "it is quite impossible that the men who devised such artistic monstrosities [the Delhi panels] could have been the same as those whose hands traced in variegated *pietra dura* the exquisite arabesques of the Taj."

Whoever the designer may have been, it is certain that the Delhi





Inlaid Decorations from the Interior of the Taj Mahal.

Before discussing Verroneo's story, it will be interesting to analyze it in order to separate the truth which may be in it from the falsehood. It is highly probable that Verroneo was one of the many architects who submitted designs for the Taj. They were doubtless in the style of the Renaissance, which was then the architectural style of Italy. Shah Jehan examined them with curiosity and expressed some qualified praise, which Verroneo mistook for approval. The anger of the Padsha on hearing of the estimates and his order "to spend three krors" clearly points to the indirect Oriental method of rejecting a proposal, and it is quite certain that Verroneo heard nothing more of his commission from Shah Jehan. He returned to Lahore and poured the garbled account of his doings into the too credulous ears of Father Da Castro, who retailed it as history to his fellow priest.

Father Manrique is also responsible for the statement that Augustin, or Austin de Bordeaux, was employed in the "internal decorations" of the Taj. Hitherto every European writer has taken this to mean that Austin superintended the magnificent inlaid work technically known as *pietra dura*, which is the most striking feature n the decoration of the building, external and internal. There is a

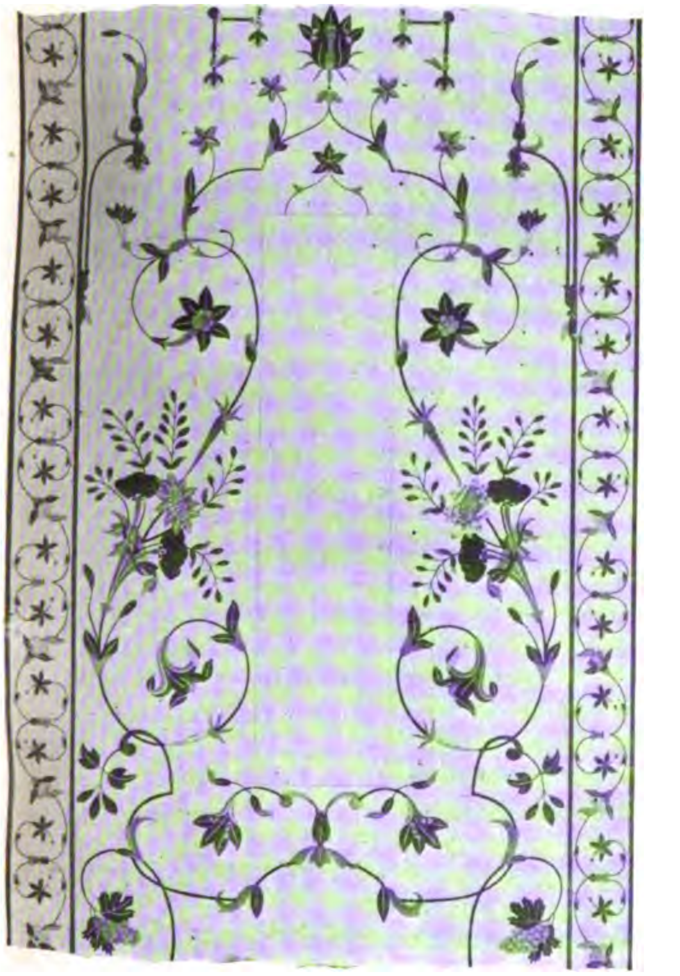
pietra dura was directed by some fourth-rate European artist. They are just as ill-adapted and out of harmony with the place they occupy, as the Taj decorations are marvellously contrived to beautify it. It is impossible to explain away the inconsistency of attributing the authorship of the magnificent Taj decorations, which are, as Sir George Birdwood says, "strictly Indian of the Mogol period," and the commonplace Florentine work at Delhi to one and the same person. This statement of Father Manrique can be explained in another and much more satisfactory way. We know from Tavernier that Austin was a silversmith, for he mentions that Shah Jehan had intended to employ him in covering with silver the vault of a great gallery in the palace of Agra. The French jeweller mentioned by Bernier in connection with the Peacock Throne is generally supposed to be Austin. Now the Taj originally possessed two silver doors, said to have cost 127,000 rupees, which were taken away and melted down when the Jâts sacked Agra. Before the existing marble screen was erected, the sarcophagus of the Empress was surrounded by a fence of solid gold, studded with gems. Surely the obvious and most satisfactory explanation of Austin's connection with the "internal decorations" of the Taj is that he was occupied with gold

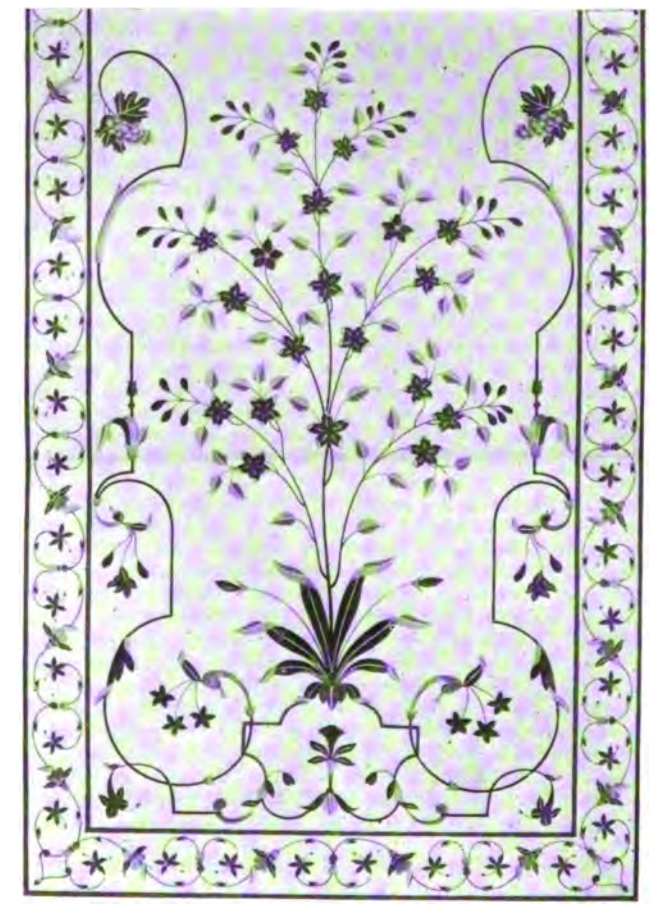
and silver work. Such work would be part of the internal decoration, and yet it would have been executed outside, so that the sanctity of the tomb would not have been profaned by an unbeliever. Why should we make a French jeweller, goldsmith and silversmith responsible for Italian and Indian *pietra dura* work, when there were both jewellers' work and gold and silver work on which he might have been employed?

In my opinion the Delhi *pietra dura* has been wrongly attributed to Shah Jehan's reign. It has all the appearance of eighteenth-century work, and, so far as I am aware, there is no evidence worth considering to show that it existed previous to the reign of Aurungzebe. It could not have been executed in the latter reign, because the naturalistic representation of birds and animals was a violation of Mussulman law, and would not have been permitted by that bigoted monarch. If the date ascribed to it is correct, it is more than astonishing that Aurungzebe, who mutilated all such representations at Fatepur Sikri, should have spared them at the back of his own throne in the Delhi palace, for an old drawing, still in existence, shows that most of the inlay was in a good state of preservation down to 1837. It would certainly coincide with all the probabilities of the case to attribute it to one of the later Mogol emperors, or the early part of the eighteenth century.

work would naturally take the place of the other, because it would be superfluous and inartistic to decorate marble or stone with an *overlay* of the same material. Again, when the Arabian art of the orthodox Sunni school came into close connection with the unorthodox Shia, or naturalistic school of Persia, we should certainly expect to find representations of natural forms taking the place of geometric patterns. These are exactly the conditions which prevailed in India in the century which preceded the building of the Taj. Even long before that time, in the oldest Saracenic mausoleum in India, the tomb of Altamsh, which belongs to the thirteenth century, the red sandstone of the walls is inlaid with geometric tiles of white marble. In the buildings of Fatepur Sikri (date about 1571 A. D.) we find frequent examples of overlay and not a few of inlay. A little later, in the gateway of Akbar's tomb at Sikandra, inlaid work is extensively used, though as yet still confined to geometric patterns. But twenty years afterwards, in the tomb of the Persian adventurer, Itmad-ud-daulah, the grandfather of Mumtaz Mahal, at Agra, the style is so far technically perfected that the inlaid work not only includes elaborate scrolls of conventional Arabian design, but the familiar *motifs* of Persian painted decoration, such as rosewater vessels, the cypress, the tree of life, and various other flower forms. The date of this building is about A. D. 1622.

The similar progression from geometric to naturalistic forms may be traced in Italian mosaic. But the synchronous development of two similar schools in Italy and in India is nothing more than one





Inlaid Decorations from the Interior of the Taj Mahal.

If we dismiss from our minds all these obscure and inconsistent legends about Austin de Bordeaux, it will be quite easy to see that the inlaid work of the Taj was the natural consummation of a great artistic movement purely Oriental in character, initiated by Akbar, the progression of which can be traced in existing Mogol buildings. Arabian workmen first introduced mosaicwork into India. The kind of mosaic generally practised by the Arabs was tesselated work, technically known as *Alexandrinum opus*, which consisted of thin pieces of marble, colored stones, glass, or enamelled tiles cut into geometric patterns, and closely fitted so as to cover the surface of a wall or floor. The technical difference between this and *pietra dura*, or true mosaic, is the difference between overlay and inlay. The Arab buildings were generally of brick, and the original intention of the mosaic was to give a surface of more precious material to a building of brick or common stone. The preference of the Arabs for geometric patterns is explained by two reasons. First, the Arabs belonged to the Sunni, or orthodox sect of Mussulmans, observing the strict letter of the law which forbade the representation of "the likeness of anything which is in heaven above, or in the earth beneath." Secondly, the geometric design lent itself admirably to the character of the materials employed, and to the speedy and effective covering of a surface by this process. Now when the Arabs, or those who had learned from them, began to work on buildings constructed chiefly of marble or fine stone, the *inlaid*

of those coincidences which often lead historians to wrong conclusions. The later Italian inlayers imitated the work of Italian fresco and oil painters. The Indian inlayers likewise imitated the work of the Persian artist who founded the Indian school of painting of the Mogol period. The step from the Itmad-ud-daulah to the Taj is simply the change from a conventional school of Persian painting to a more developed and more realistic one. This is only what we might expect if we remember Shah Jehan's resolve that the Taj should surpass every other building in the world. That there was a strong naturalistic tendency in the Indian painting of the Mogol period is known to all who have studied this interesting phase of Mogol art. It is very clearly shown in a series of exquisite miniature paintings of Jehangir's time, now in the Government Art Gallery, Calcutta, which I fortunately rescued from the unappreciative hands of a Mohammedan bookseller a few years ago. They include portraits of the nobles of Jehangir's court and some studies of Indian birds, drawn and painted with a fidelity and delicacy which would do credit to a Japanese master. On one of them, sealed and signed by Jehangir himself, there is a note, written by the Emperor, to the effect that it was painted by Ustad Mansur, "the most celebrated painter of this time," in the nineteenth year of his reign (A. D. 1624, six years before the Taj was begun). The borders of three of these paintings are ornamented with floral designs which, making allowance for the different technical treatment required by a different

material, are of the exact type of the Taj decorations. No one who studies these remarkable paintings and compares them with the floral decoration of the Taj would hesitate to say that it was the work of this Persian school, and not any European model, that the Indian mosaicworkers were imitating. It might possibly have been these same paintings, prized so much by his father, that Shah Jehan gave as patterns to the workmen.

No doubt it is true that here and there in Mogol art one meets with a detail which suggests European influence. It was a time of great artistic activity, and in such times any living art which comes into contact with another exchanges ideas with it. But the European element in the Mogol style is far less strongly marked than is the Oriental in Italian art. During the whole period of Italy's close commercial intercourse with the East, her art industries were very strongly impressed with Oriental ideas. It would be easy to find in Italian art a dozen instances just as striking as the similarity (which is a similarity of technique and not of style) between the *pietra dura* of Florence and that of the Taj. No one suggests, on that account, that Indian artists came to Italy to instruct the Italians.

It is probable that long before the building of Itmad-ud-daulah's tomb the art of inlaying had been learned by Hindu workmen and become absorbed into Indian art through that wonderful power of assimilation which Hinduism has always shown. Some Indian records of the Taj mention the name of one Mannu Beg, from *Rum*, as the principal mosaicworker; but, in the list of the principal workmen given by the Imperial Library manuscript, five mosaicworkers from Kanauj, all with Hindu names, are entered. That they were artists of great reputation may be gathered from the fact that their salaries ranged from 200 rupees to 800 rupees a month. The best Agra mosaicworkers of the present day are also Hindus, and in many parts of Northern India the artistic traditions of the Mogols are still kept alive by Hindu workmen.

The Mogol style is a symphony of artistic ideas formed into an interchanging harmony by the fusion of Hindu thought with the art of the two rival sects of Mohammedanism, the Sunni and the Shia. Ruskin's criticism of Mogol architecture as an "evanescent style" is a very superficial one. The great development of Mogol art represented by the Taj died out because during Aurungzebe's long reign the bigotry of the Sunni sect was in the ascendant, and the Shia and the Hindu artists were banished from the Mogol court. But before Aurungzebe's accession the traditions of Mogol architecture were firmly established in the more distant parts of his dominions, and there they survive to this day, absorbed into the great cosmogony of Indian art, and only prevented from continuing their natural evolution through the fatal want of artistic understanding which has made the dead styles of Europe the official architecture of India.

The Taj has been the subject of numberless critical essays, but many of them have missed the mark entirely, because the writers have not been sufficiently conversant with the spirit of Eastern artistic thought. All comparisons with the Parthenon or other Classic buildings are useless. One cannot compare Homer with the Mahabhârata, or Kalidâs with Euripides. The Parthenon was a temple for Pallas Athene, an exquisite casket to contain the jewel. The Taj is the jewel, the ideal itself. Indian architecture is in much closer affinity to the great conceptions of the Gothic builders than it is to anything of Classic or Renaissance construction. The Gothic cathedral, with its sculptured arches and its spires pointing heavenwards, is a symbol, as most Eastern buildings are symbols. But the Taj stands alone among Eastern buildings; for it represents in art the same effort towards individualism, the struggle against the restraints of ritualism and dogma which Akbar initiated in religion.

Every one who has seen the Taj must have felt that there is something in it, difficult to define or analyze, which differentiates it from all other buildings in the world. Sir Edwin Arnold has struck the true note of criticism in the following lines: —

> Not architecture! as all others are,
> But the proud passion of an Emperor's love
> Wrought into living stone, which gleams and soars
> With body of beauty shrining soul and thought;
> . . . . as when some face
> Divinely fair unveils before our eyes —
> Some woman beautiful unspeakably —
> And the blood quickens, and the spirit leaps,
> And will to worship bends the half-yielded knees,
> While breath forgets to breathe. So is the Taj.

This is not a mere flight of poetic fancy, but a deep and true interpretation of the meaning of the Taj. What were the thoughts of the designers, and of Shah Jehan himself, when they resolved to raise a monument of eternal love to the Crown of the Palace, Taj Mahal? Surely not only of a mausoleum, a sepulchre fashioned after ordinary architectural canons, but of an architectonic ideal, symbolical of her womanly grace and beauty. Those critics who have objected to the effeminacy of the architecture unconsciously pay the greatest tribute to the genius of the builders. The Taj was meant to be feminine. The whole conception, and every line and detail of it, express the intention of the designer. It is Mumtaz Mahal herself, radiant in her youthful beauty, who still lingers on the banks of the shining Jumna, at early morn, in the glowing midday sun, or in the silver moonlight! Or, rather, we should say it conveys a more abstract thought: it is India's noble tribute to the grace of Indian womanhood, the Venus de Milo of the East.

To the art student nothing can be more fascinating than the endeavor to analyze the artistic thoughts of different countries and different races. But England as a nation has a concern in trying to understand Indian ideals. For it is neither by railways and canals, sanitation and police, coal-mines and gold-mines, factories and mills, nor by English text-books, and the real or imaginary fusion of Western and Eastern culture, that we shall build for ourselves a permanent Indian Empire. Nor shall we flatter ourselves that British justice is creating in India a lasting sense of gratitude for British rule. The very uprightness of our rule is slowly but surely creating an Indian Question which, though it seems smaller than a man's hand to-day, may fill the Eastern horizon to-morrow. When India has grown out of its political infancy it will yearn for something more than just laws and regulations. India is governed by ideas, not by principles or by statutes. Concrete justice, as represented by the complicated machinery of the British law, is to the Indian a gamble in which the longest purses and most successful liars win. Abstract justice, as it was personified in the Great Queen, the mother of her people, touches India to the quick. That one idea has done more for Indian loyalty than all the text-books of the Universities or Acts of the Governor-General in Council. It was only an idea that roused India in 1857, and before an idea which touched the profounder depths of Indian sentiment all the Western culture in which we believe might be swept away as dust before a cyclone and leave not a trace behind.

E. B. HAVELL.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

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BACK OF SEAT IN THE LOGGIA DI PAPA, SIENA, ITALY.

DONATELLO'S CANTORIA [RESTORED] IN THE MUSEO DI STA. MARIA DEL FIORE, FLORENCE, ITALY.

CERCLE ARTISTIQUE, LA HAYE, BELGIUM. M. MUTTERS, ARCHITECT: TWO PLATES.

NOTES & CLIPPINGS

THE NEW ORLEANS SEWERAGE SYSTEM.—In the presence of a large assemblage of citizens Mayor Capdevielle last week turned the first spade of earth in the work of constructing the vast system of sewerage, water and drainage, which is to place New Orleans abreast of the best sanitated cities of the world, and which is to cost $18,000,000. The great undertaking is to be completed within the next five years. — *Exchange.*

THE ZIMBABWE RUINS. — Mr. R. W. Hall has finished his report on the ruins at Zimbabwe, in Mashonaland, described by Mauch, Theodore Bent, Keane and Karl Peters. He found soapstone beams and cylinders very curiously and finely carved, chiseled discs of soapstone representing the sun, bowls of the same material and pottery resembling that found in North Africa. He also found black beads with white circles, minute yellow and green beads of glass, a copper battle-axe, and objects of veneration used in nature worship. Among the Mashonas was found a rude headless animal in pottery, striped like a zebra, which resembles similar things in Phœnician tombs. Prof. A. H. Keane has argued that the Sabæans and Minyans of South Arabia, who formed the rock inscriptions so plentiful in Yemen, were the colonists who built the strange citadels in Mashonaland, and through their kinship with the Phœnicians supplied the peoples of the Mediterranean with the greater part of their gold. We have an example in the story in the Bible of David and Solomon and their commercial alliance with Hiram of Tyre. Unfortunately no inscriptions have as yet been found by means of which a close connection could be shown between these ancient gold-diggers and the South Arabians. — *N. Y. Times.*

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Classified Index Continued.

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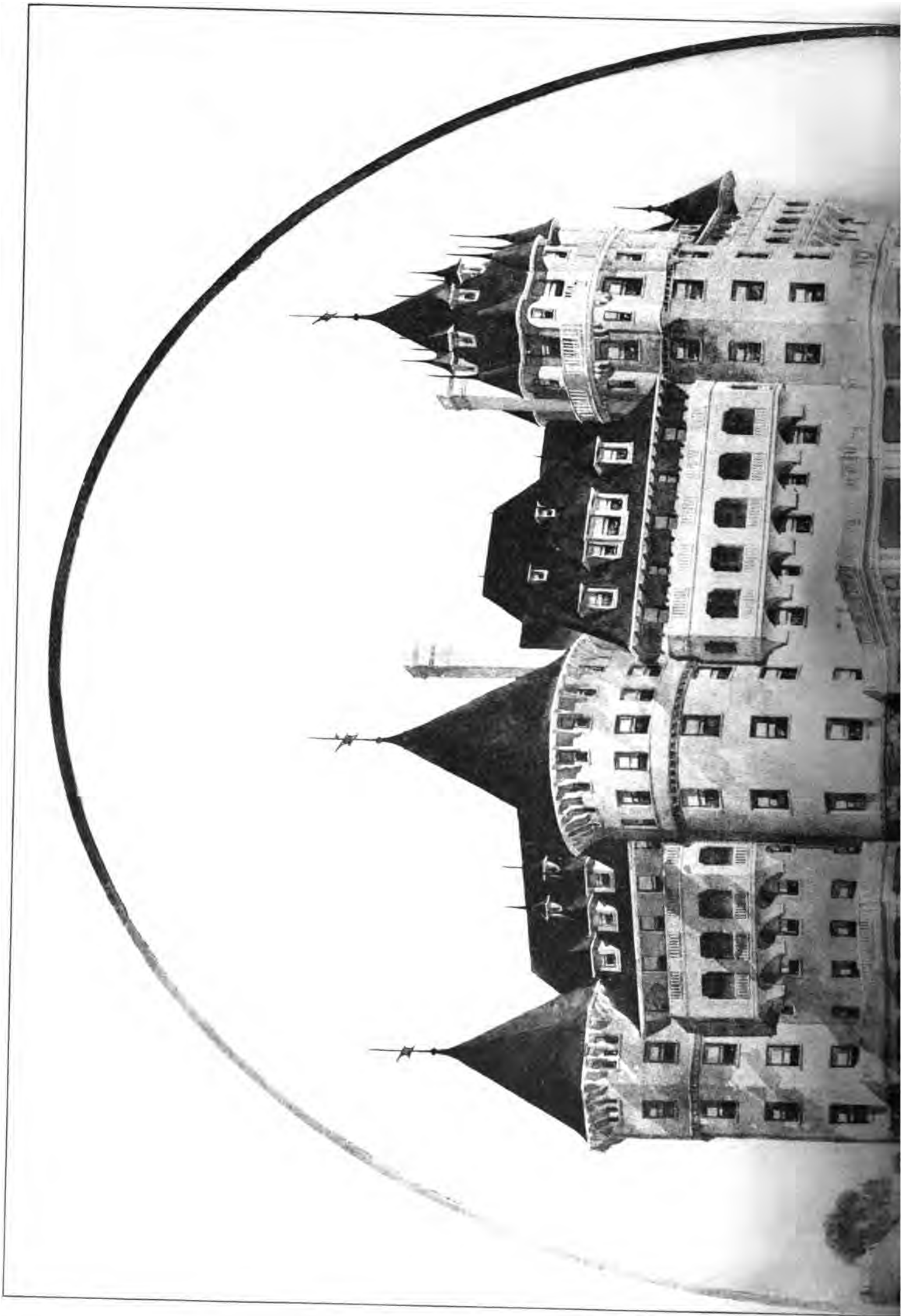

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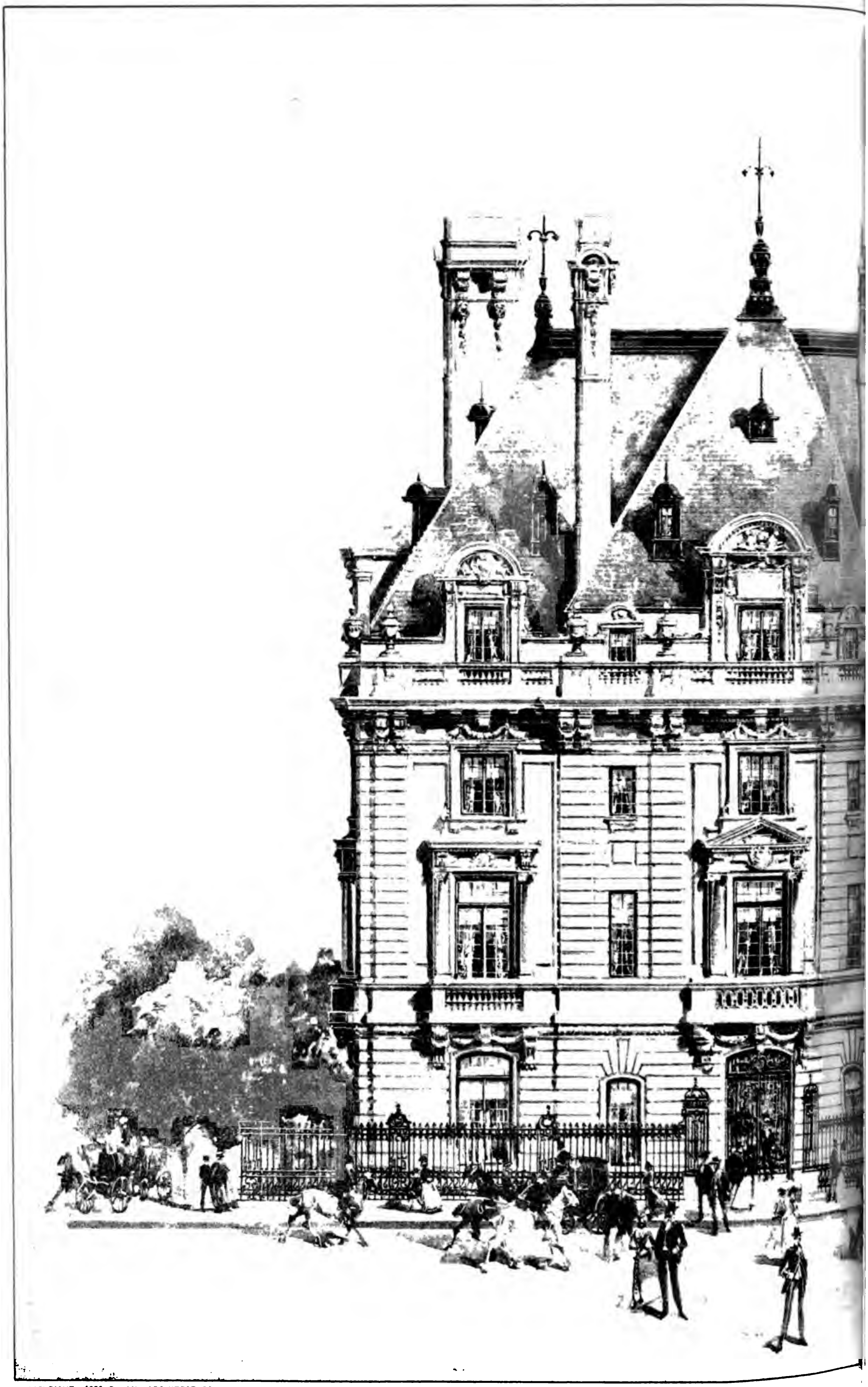

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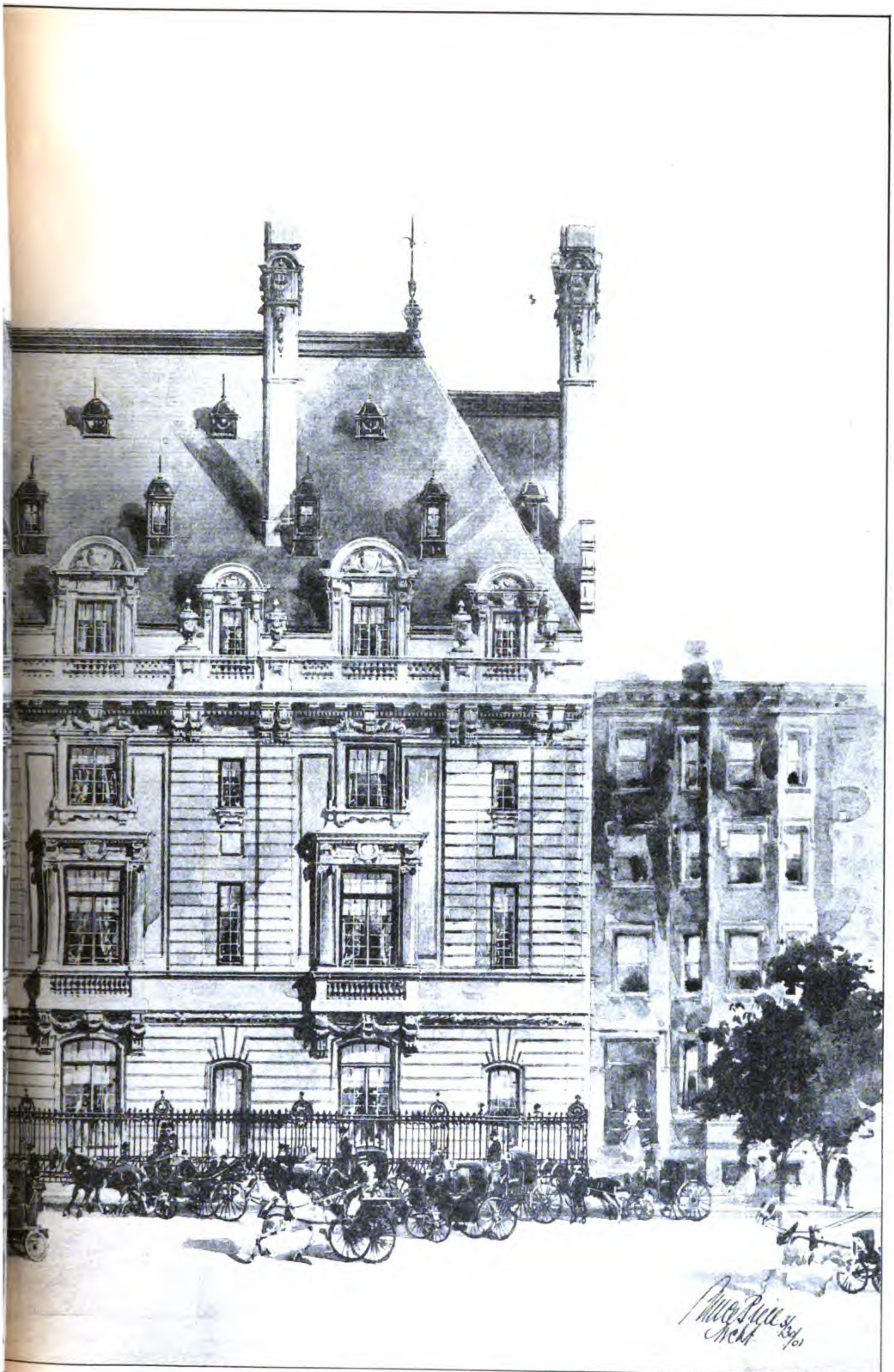

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WE print in another column a letter from Professor Martin, in regard to the new alternative course in architecture at Cornell University, and very gladly correct anything that we may have said in commenting, with imperfect knowledge, upon the first newspaper paragraph which appeared in relation to it, as a course without mathematics. As Professor Martin explains, it should, perhaps, be termed rather a course with something else substituted for calculus than a course without mathematics; and the question whether an architect always needs to study the calculus is still an open one. Practically, no architect uses the calculus in his work, as the occasions on which he might employ it advantageously are so rare that it is less troublesome to consult a mathematical friend than to brush up his own knowledge; and its value in architectural education is for the mental training which it gives; so that it is quite conceivable that for some minds more suitable mental training may be had in another way. We cannot enter here upon the discussion of the subject, which is one of statistics and experience, rather than opinion; but, whenever the statistics and the results of experience can be collected and compared, the architectural world will find them of great interest.

THE whole subject of architectural education is one of immense importance, not only to the profession, but to the community. How are we to train men to design buildings which will delight our posterity as those that our ancestors designed delight us? Some answer this question by demanding accurate copying of good examples; but, although the great masters of the Renaissance measured and sketched the antique with scrupulous fidelity, their own works were very far from being blind copies of the antique; while the Gothic architects of the thirteenth century had nothing to copy from, even if they had desired to do so, and the architects of antiquity, although they confined themselves to a small range of forms, were far from being copyists. Sentimental people will say at once that the thirteenth century Gothic, as well as the Doric of Ictinus, and the Renaissance of Palladio, had the "divine spark," while modern work has no divine sparks. We are not so sure about the latter theory; but, at least, the divine spark does not shine very brilliantly in modern architecture, and it is a proper object of modern architectural education to try to revive it. A favorite view, which has much to commend it, is that the study of nature is essential to production of beautiful architectural design; and we know that the great architects of antiquity, of the Renaissance, and of the Middle Ages, were familiar with natural forms, even when they were not also professional sculptors; but it may be questioned whether this is enough. If we are not mistaken, the German architects, who are commonly supposed in this country to have nothing but an engineering education, with a little architectural history added, have more practice in drawing from the life during their university course than is given in any school of architecture in this country, or is required even in the School of Fine-Arts in Paris; yet, clever and picturesque as modern German architecture is, very little of it can be called beautiful. Here, then, the theory seems to be defective. It is not, as some people would have us suppose, that the German character is incapable of perceiving beauty of form, for much of the modern German sculpture is unrivalled in its way; but the study of form does not seem to affect German architects in the way in which it affected those of Greece, or Italy, or France; and there is, apparently, need of further investigation before the subject can be cleared up. Such investigation can be better made here, perhaps, than anywhere else, by comparing the various curricula of the professional schools with the work which they turn out. Of course, the individual capacity of students, or accidents of other kinds, will vary the results; but, as the scientific man eliminates individual eccentricities by averaging a great number of specimens, so it may be possible to conclude, with approximate certainty, that the study of mathematics in one school, or assiduous drawing from the life in another, or liberal practice in modelling in a third, is favorable, or unfavorable, to the feeling for proportion and composition of lines, surfaces, lights and shadows on which architecture, considered as a fine-art, depends.

THE building world has heard with great regret of the financial difficulties of the great building corporation of Norcross Brothers. We have no idea of writing an obituary notice of a concern which has, as we hope and believe, many years of prosperity still before it; but it may be interesting to trace the career of this great corporation, the largest but one in the world devoting itself to building. Thirty years ago the firm of Norcross Brothers consisted of two members, who carried on a modest business in the city of Worcester, with profit to themselves and satisfaction to their neighbors, to whom they were known as honest, able and enterprising. The elder brother, a quiet, prudent person, and an excellent mechanic, retired from the business, with an ample fortune, some years ago, leaving it to the younger, a man of remarkable character. Many of our professional readers have seen something of Orlando W. Norcross, and we venture to say that all those who know him have been profoundly impressed with his quiet force, and the precision of his ideas. Reserved and modest in his manner, it was his way to listen attentively to what others had to say, and then, in a few words, present the matter with a clearness which made other people's thoughts seem vague and wandering. Under different circumstances he would have made a great general, cool, energetic, resourceful and reserved, as well as high-minded and compassionate. Fortune, however, engaged him in industry, and he became a leader in this industry, as he would have been a leader in any occupation. Almost from the first, he saw in the profession of building a field for the exercise of the brilliant faculties with which nature had endowed him. Not content with building as every one else built around him, he studied new methods, new materials and new designs. Few builders have had so just an appreciation of architectural beauty, and the late H. H. Richardson owed much to the sympathy with which Mr. Norcross, then young and comparatively unknown, entered into the spirit of his work. His zeal for trying new effects, new processes and new materials probably interfered, in some degree, with his financial success. He designed and used machinery for hoisting and transferring materials on a scale never known before; he secured land, and opened quarries of marble, sandstone and granite in perhaps twenty different places; he made bricks; carried on a great iron-working establishment; cut, turned and polished, with ingenious machinery, imported marbles, as well as stone from his own quarries; operated one of the best-equipped wood-working mills in the country; and, for a time, carried on a plumbing department. In addition to all these cares, he distinguished himself for sturdy maintenance of the right to employ non-union men, and, in defence of his principles, carried

on, with his usual quiet fortitude, and his usual success, many a struggle with the union leaders. His contests were with the leaders, not with the men, for the Norcross men, whether union or non-union, were rarely discontented. Every summer, for many years, all the Norcross workmen were invited with their families to their employer's house, where the lawn gave room for games for the athletic, while those more quietly disposed enjoyed themselves in other ways for the day; and the personal relations of all concerned in the operations of the firm were uniformly pleasant.

IT is probable that the great extension of the business of the Norcross Company of late years has been, as so often happens, unfavorable to its profitable conduct. It is an old proverb that nothing can take the place of the eye of the master, and there is a physical limit to the amount of personal attention which the most energetic man can give to his affairs. We have no idea of telling tales out of school, much less of saying anything to the discredit of a firm whose members we are glad to claim as friends of many years' standing; but we may recall, as an illustration of certain disadvantages of too large a business, that once, on a visit to the Norcross establishment, after the operations of the firm had grown to a figure of several millions annually, we found the principals absent, and two draughtsmen lying comfortably on their backs on the drawing-tables of the great draughting-room. This was a small matter, it will be said, and it was certainly an exceptional instance, for no one, perhaps, has ever been served more loyally by most of his employés than Mr. Norcross; but one idler out of a hundred people employed makes a very perceptible inroad into the profits of a business conducted under such keen competition as that which prevails in building, and not even improved machinery, or control over the supply of materials, can take the place of faithful service. So far as the Norcross Brothers Company is concerned, it is probable that the relief from pressing financial perplexities brought about by the receivership will do much to assist in the economical and efficient completion of the contracts now in progress or hereafter undertaken, and the financial statement of the corporation shows that there is a large surplus of assets over liabilities, even without including the profit which it is reasonable to expect on the completion of building contracts amounting to more than twelve million dollars.

THE Master Masons' Association of Boston has issued a circular to the public in regard to the strike of union bricklayers in that city. As every one concerned with building knows, this great industry has for the last twelve years been carried on in Boston under very favorable conditions, employers and men working together, under an agreement which prevents strikes, and provides for the settlement of all differences, and of wages and working hours, by a joint Board of Arbitration. A few weeks ago, the bricklayers' union, without notice, withdrew from this agreement, demanding an increase of wages, as well as assent to a new agreement of a different character. The employers would probably not have objected to the increase of wages, if it had been asked for in the manner agreed upon, and established by the joint Board, with notice sufficient to enable contractors to make their estimates in accordance with it; but they objected to the breaking of the agreement already existing, and to the substitute presented to them. Several attempts have been made to have the former agreement, which provides for increasing wages, with due notice, whenever the joint Board shall consider it advisable, renewed, but, until now, without success; and the Master Masons' Association asks for the support of architects and the building public generally in its efforts to maintain a system which has secured to building workmen in Boston for twelve years good wages, and reasonably steady employment, while it has facilitated and encouraged building investments.

A GREAT French police official always instructed his detectives, when a crime had been committed, to "look for the woman"; his theory being that a woman always furnished either encouragement or motive for criminal actions. We will observe that the French now improve on this maxim by saying that a woman generally furnishes the inspiration for good, as well as bad, actions, and then proceed to apply it to the consideration of the Boston bricklayers' strike. In labor troubles, as the New York investigations have shown, it is wise, instead of looking for the woman, to look for the money, and the root of all evil is very frequently found to be also the root of industrial demonstrations. We should be far from attributing to the officials of any Boston union a disposition to look with anything but the eye of austere virtue upon the union funds in their care; but the bricklayers' union in Boston is said, on good authority, to have accumulated, at the beginning of the present year, a "strike fund" of thirty-five thousand dollars. This is a good deal of money, and a prudent man might be excused for regretting to see it lie idle. To say nothing of the facilities which it would afford a treasurer like Mr. Murphy, of Brooklyn, for "having a good time" in Europe, as a relief from his cares, there are many other applications which might be made of it, for the purpose of setting it in circulation. Which of them would appeal to the Boston union we will not attempt to say; still less would we suggest that an auditing committee should inquire into its investment; but when the history of the present strike is written, we should not be very much surprised to hear that it would not have happened if there had been no strike fund.

THE settlement of the struggle between the New York Employers' Association and the unions has brought about a result which might really have been expected, although it is probable that neither party thought of it at the time the settlement was made. Under the arbitration agreement the employers offered to negotiate, in case of dispute, with unions, of course without specifying any particular sort of unions, as the unions themselves are constantly changing. The walking-delegates took advantage of this to try to stop all building operations by keeping some of the smaller unions from signing the arbitration agreement, after most of the more important ones had done so, imagining that they could coerce or distress the employers, and the great majority of the men, by keeping a small number of indispensable men from resuming work. This has always been a favorite manœuvre of labor leaders, and it seems to have been partially successful for a time. Now, however, the managers of the Employers' Association, who have been besieged by members, even of the unions kept on strike by the walking-delegates, begging for employment, have made a decisive move, and have notified members that they are at liberty, and are required, to treat with workmen belonging to trades still on strike as individuals, accepting, as comprehended in the terms of settlement, any man who will, on his own account, sign the arbitration agreement, at the same time recognizing any unions which may hereafter be formed in such trades by men who have signed the agreement. The managers of the Association must have felt themselves sure of the support of the great mass of building workmen before venturing upon this bold stroke; but the distresses of the men whose unions have accepted the agreement, but who see their families starving in the interest of the walking-delegates, together with the revelations of the dishonesty and incapacity of union officials, have brought about a state of mind among union members in which the voice of justice and common-sense has, for the first time for many years, a chance to be heard. It is evident that this manœuvre cuts the ground completely from under the feet of the walking-delegates. If they cannot prevent men from working who do not belong to their unions, their power is gone, and the members of the unions who have signed the agreement, in their indignation against the leaders who have for so many years enriched themselves at their expense, will probably endorse the position of the Employers' Association, that unions presided over by convicted blackmailers and thieves are not the only sort that are entitled to recognition; and that a union may consist of one man, if he is ready and willing to conform to the principles of those with whom he works, and to do his part toward supporting the true interests of working people. Meanwhile, the principle, that a man is not obliged to buy a card from an insolent swindler before he is allowed to earn an honest living, has been established at a single stroke, without violence, and with, apparently, the approval of the great majority of union members, in the city which had seemed most hopelessly given over to the labor tyrants; and this great victory for liberty and justice has been won by a handful of able and earnest men, supported by the confidence of the public, and wise enough to take advantage of a favorable opportunity.

TABLE-GLASS.[1]

WHY or when a glass manufactory was founded in "Alsatia" I am unable to say definitely. The proximity of the river and the depreciated value of the property, owing to an evil reputation, may have been inducements to the original founder. The works must have been in existence before the end of the seventeenth century, for an advertisement of the wares produced appeared in the *Tatler* in 1710, and the manufactory must have been in a tolerably advanced condition to warrant an advertisement in such an important periodical. The advertisement ran as follows: —

"At the Flint Glass-House in White Fryars near the Temple, are made and sold by Wholesale and Retale, all sorts of Decanthers, Drinking Glasses, Crewitts, &c., or Glasses made to any pattern of the best Flint, as also all sorts of common Drinking-Glasses and other Things made in ordinary Flint Glass, at reasonable Rates."

It is about the direct lineal descendant of these "decanthers and crewitts" that I am about to speak.

All table-glass worthy of the name is blown glass. Every vase, wine-glass, or decanter has commenced its career as a white-hot, solid mass of viscous material coiled round the end of a long iron blowing-tube. A well regulated puff of breath through the tube creates a bubble and the bubble is the embryonic stage of all table-glass.

The form of the bubble can be readily modified. Glass so long as it is hot is almost infinitely ductile, and even after it has been partly chilled its ductility can be restored by reheating. If the bubble, while still attached to the blowing-iron, is held downwards it lengthens out into an ellipse; if the blowing-iron is held vertically with the bubble uppermost the bubble compresses itself into the form of a "scone," and if the "scone" is pierced in its centre, and the blowing-iron is trundled like the handle of a mop the "scone" unfolds itself into a flattened disc. By these simple movements (which are in constant use in the glass factory) the form of the bubble is modified without the use of tools. With the aid of a primitive looking tool, closely resembling an exaggerated pair of sugar-tongs, and of a stool or chair, with two parallel projecting arms, between which the workman sits, and on which he rests and rolls the iron rod to which the glass is attached, every imaginable modification of a spherical form can be developed.

At the present time, owing to a demand for excessive regularity and excessive lightness and thinness, very many of the simple forms of table-glass are blown in moulds. This process of moulding requires comparatively little skill, and the valuable training which the fashioning of simple forms with the tool affords is being lost. If the fashion and demand for so-called "aërial" glass is long continued the skilled craft of glass blowing will disappear.

The English glass-blower (however clever he may be with his fingers) has no talent for design. He is painfully realistic, and if asked to produce a vase (without a pattern to guide him) will make an accurate model of a man's tall hat, a pair of bellows, or some other everyday piece of furniture, but will fail to create anything combining originality with beauty of outline. What technical education will do for the English glass-blower in the distant future remains to be proved.

The limitations of design are very strait. When what appears to be a fresh form or combination has been evolved, the discovery is generally made that the same has been done, and done better, ages before. Even when a satisfactory design has been produced, the designer may meet with unexpected difficulties owing to the wealth of possibilities of failure belonging to the craft. The would-be designer must closely and constantly watch the phases of form through which vessels pass, while being fashioned, and must note any outline that appears to be beautiful or novel. The most successful designs have been based on such study combined with the study of the productions of early Venetian, Dutch and German master-craftsmen.

In recent years, Mr. T. G. Jackson, R. A., was one of the first to realize that a wine-glass may be something more than a bowl upon a stick, and that a graceful outline is not incompatible with utility.

About 1875, the late William Morris made several designs for table-glass, possessing, as all his work possesses, interest, beauty and originality.

Mr. Albert Hartshorne has written and illustrated a voluminous work on the evolution of drinking-glasses. The chief variation is shown to have occurred in the leg, and the variation may obviously be almost unlimited. Legs may in section be solid or hollow, cylindrical or oval, square or oblong. They may be twisted; they may be, as it were, turned, with hollows, curves and projections; they may be in one piece or in many pieces, and they may be ornamented with seals, frills, or "pinchings." Even the inside of an apparently solid leg may be decorated with plaited threads of colored enamel, or with spiral air-bubbles. These corkscrew lines of silvery air have a very simple origin. The leg is made from a small lump of viscous glass. Into this lump as many pin-pricks are made as spirals are required. The lump is then pulled out into a leg, and twisted at the same time. As the leg stretches and twists, the pin-pricks stretch and twist, and display themselves as spiral coils of air.

There is not the same scope for variation in the forms of decanters and jugs as there is in the form of drinking-glasses and vases. The handles of jugs may be distinctly decorative, but are always treacherous. With the view of obviating the necessity for handles, decanters have been made with flat or dented sides so as to afford a secure grip for the fingers, but public taste has demanded that even these shapes should have handles affixed.

The display of niceties of form depends in no small degree on the chemical nature of the glass employed. For this purpose the soda-lime glass, which is used in Venice, and the use of which has recently been introduced in England, although it is seldom absolutely white, and often streaky and bubbly, is better adapted than the obtrusively brilliant potash-lead glass, from which English table-ware is commonly made.

The mention of the chemical nature of glass naturally introduces the subject of color. Some thirty years ago the colors available and used for English table-glass were ruby, canary-yellow, emerald-green, dark peacock-green, light peacock-blue, dark purple-blue and a dark purple.

About 1870, the "Jackson" table-glass was made in a light dull green glass, similar to that used in stained-glass as "white," containing a wealth of bubbles and interesting irregularities. Owing to these so-called defects, the glass only appealed to a very select circle. The dull green, commonly known as "pale-green," was followed successively by amber, white opal, blue opal, straw opal, sea-green, horn-color and various pale tints of soda-lime glass, ranging from yellow to blue. Experiments have also been tried with a violet-colored glass, a violet opal, a transparent black, and with glasses shading from red to blue, red to amber and blue to green. Touches of color have been added to vessels in course of manufacture by means of seals or tears of molten glass, applied like sealing-wax; or by causing vessels to wrap themselves round with threads or coils of colored glass. By the application of a pointed iron hook, while the vessel and thread are still ductile, the parallel coils can be distorted into bends, loops, or zigzags.

The surface of vessels may be rendered lustrous by rolling the hot glass on metallic leaf, or iridescent by the deposition of metallic tin, or by the corrosion caused by the chemical action of acid fumes. Gilding and enamel decoration are applied to vessels when cold, and fixed by heat.

Cutting and engraving are produced by pressing the surface of vessels against the edge of wheels revolving on horizontal spindles. "Cutting" wheels range from 18 inches to 3 inches in diameter, and are made of iron for grinding, stone for smoothing and wood for polishing. "Engraving" wheels are small, ranging from 1 inch to ¼ inch, and are made of copper.

It is the fashion to run down cutting as a form of decoration, a fashion which is partly due to a somewhat ill-advised pronouncement of Professor Ruskin's. In appendix 12 of the second volume of "*Stones of Venice*," he says with regard to glass, "durability and transparency being the two peculiar characters of glass, all work in glass is bad which does not with a loud voice proclaim one or other of these great qualities, and, consequently, all cut glass is barbarous."

In making this statement Professor Ruskin evidently forgot that the power of reflecting and refracting light is also a peculiar and important character of glass. It is true that the process of cutting was carried to an extreme pitch of vulgarity in the middle of the last century, but there are many specimens of English and Irish cut-glass of the eighteenth century of great refinement and beauty.

The true use of engraving is to add interest to vessels by means of coats-of-arms, monograms, inscriptions and graceful outlines. The improper, but too common, use of engraving is to hide defective material.

In the Paris Exhibition of 1900, surface decoration was the prominent feature of all the exhibits of table-glass. The carved or "cameo" glass, introduced by Thomas Webb, of Stourbridge, in 1878, had been copied with varying success by glass-makers of all nations. Frequently the surface had been dulled by acid, so as to produce what is called a "satin" finish. M. Emile Gallé and Daum Frères, of Nancy, exhibited specimens of this form of decoration possessing considerable beauty. The so-called "Favrile" glass of Messrs. Tiffany, of New York, owes its effect in great measure to surface color and lustre. The vases of Karl Koepping, of Berlin, are exceedingly graceful and fragile, but appear to be creations of the lamp rather than of the furnace.

I have already referred to the impetus given to the manufacture of English decorative table-glass by William Morris and T. G. Jackson. I am unwilling to allow this opportunity to pass without mentioning two other benefactors of the craft of glass-working, although their influence has only affected table-glass indirectly. To the one, Charles Winston, is due what may justly be called the Renaissance of English stained-glass; to the other, Sir W. B. Richmond, is due the demonstration on a large scale that English mosaicwork is a practicable form of structural decoration.

Winston was born in 1814, and died in 1864; he was a busy barrister, but devoted all his spare time to archæology, and especially to the study of stained-glass of the twelfth, thirteenth, fourteenth and fifteenth centuries. In the pursuit of his hobby he examined nearly all the best examples of ancient stained-glass in England, and made a large number of careful drawings from them. He satisfied himself (as stated in his memoirs published in 1865) that "the success of a glass painting depends as much on the quality of the material as on the skill of the artist." What he did for stained-glass can best be

[1] A paper by Mr. Harry Powell, read before the Society of Arts and printed in the *Journal* of that Society.

illustrated from his own letters. Writing to his friend, Mr. C. H. Wilson, he says, "Ever since 1850 I have been amusing myself, at no small cost, in having analyses made of ancient glass. . . . I offered to Chance of Birmingham the analyses if he would attempt to work them out, but he refused. Ultimately Powell offered to take the matter up, and erected a furnace for the purpose. It is fortunate that he did offer, for without his aid there would have been no practical result, and had his place been farther from the Temple I could not have attended to the experiments as much as I did. . . . I have had two windows done in the Temple Church (the round part) to commemorate our triumph. . . . The new material is as harmonious, brilliant and at the same time solid in appearance as the old glass. . . ." Again writing in July, 1854, about a window in Lincoln Cathedral, he says, "I do not see the slightest difference between it (the new glass) and the old, except the dirt. The ruby is splendid."

The colored glass made for mosaic windows was for long known as "Winston's" glass. It was the origin of the stained-glass branch of these works, and was a cause of contact with Burne-Jones, Morris, Ford Madox Brown, Poynter, Moody, J. Doyle, Albert Moore, Jackson, Wooldridge, Holiday and other artists.

A letter, written by Winston in November, 1854, forms a link between his work and that of Sir W. B. Richmond. He writes: — "*Dear Powell*, — I have at last got some specimens of the glass mosaicwork from St. Sophia, at Constantinople, and from St. Paul's, at Rome, which I have given to Mr. Clarke to analyze, and I doubt not you will soon be able to produce the same yourself." It was long before this prophecy was fulfilled. A period followed devoted to experiments in the manufacture of enamels and in technique. One relic of these experiments is an angel's head, executed in 1865. Subsequently, panels of glass pictorial mosaic were erected at South Kensington Museum, and pavements of glass mosaic were put down at South Kensington, at the Society of Arts, and in several churches.

In 1884, a large panel representing the central group of Raphael's "Disputa" was put up on the east wall of the morning chapel of St. Paul's Cathedral, and in 1887, Holman Hunt's picture of "Christ with the Doctors in the Temple," was translated into mosaic for the reredos of Clifton College Chapel. Both these works were executed in what is known as the "New Venetian" method, *i. e.*, they were treated as panel pictures, and worked in a workshop.

In 1891, Sir William Richmond, R. A., was commissioned to carry out the decoration of the choir of St. Paul's Cathedral in glass mosaic. A study of these mosaics (all of which, with the exception of two angels of the Passion at the extreme east of the choir, were executed *in situ*) will prove the superiority of Sir W. Richmond's method of working. St. Paul's affords ample scope for comparing the two methods (the "workshop" method and the *in situ* method), for not only (as has already been stated) are there examples of English glass-mosaic worked in the Venetian method, but there are important examples of Venetian work in the pendentives of the dome, and is on the west wall of the morning chapel. If, however, further proof needed of the superiority of the "*in situ*" to the "workshop" method, a comparison should be made between some of the unrestored mosaics in Ravenna, which were certainly worked *in situ*, with mosaics in Rome and Venice, which have been "restored" by the Venetian method.

Sir William Richmond has proved that mosaic must be used as the colored surface of a structure, and not as pictorial panels fixed to a structure. If this may be accepted as an axiom, the whole process of mosaic is enormously simplified. There is no need for minute shaping or fitting of the tesseræ. Indeed, so great is the covering power of gold and colored enamels, that in some positions (according to the distance from the eye) the tesseræ may be placed at from ⅛ inch to ¼ inch apart, and yet the whole service is adequately colored. There is no need of an extensive palette; every shade and tint can be produced by the contiguity of contrasted colors. By working *in situ* the ground itself, as well as every fragment and contrast of color, can be given its full value. There is, moreover, no real difficulty in working *in situ* or of supervising the work.

It may be asked why, in a paper on "table-glass," I should have referred to the work of Winston and Sir W. Richmond. Their influence, however, on table-glass, though indirect, has been of considerable importance. It was the manufacture of Winston's glass that suggested the manufacture of vases and table-glass in soda-lime glass; and the preparation of the colored gold and enamels for Sir W. Richmond's mosaics suggested the introduction of many of these colors and combinations of colors in the manufacture of table-glass. There is yet another reason for this apparent digression; stained-glass windows and mosaics, as well as opaque glass tiles and "opus sectile," thermometer tubes, and pump-barrels, electric-light fittings, and work in silver and in iron are all descendants and developments from the "crewitts, decanthers," and other simple forms of table-ware which were advertised in the *Tatler* in August, 1710.

THE ARGILO-CALCAREOUS OR SAND-LIME BRICK (GIRARD-MEURER PROCESS).—I.

THE argilo-calcareous or sand-lime brick is in reality a compressed mortar composed of sand, lime and clay, hardened by means of steam under pressure. In the manufacture of this brick, however, the compound does not solidify as in the case of ordinary mortar, for whereas the latter becomes hardened by the hydration of the double silicate of lime and alumina existing beforehand in the lime, the former hardens by forming that hydro-silicate in the presence of the steam under pressure. The discovery of the action of steam on lime in the presence of silica, is due to the famous chemist Michaelis, and dates back to the year 1880. Another noteworthy fact is, that while ordinary mortar requires from several weeks to several months to acquire its proper degree of resistance, the compound of which the sand-brick is composed acquires, by reason of the treatment to which it is subjected, a greater resistance in a few hours.

Michaelis, in his experiments, had, it must be mentioned, considered only the action of steam on sand and lime, whereas Girard, the inventor of this new building-material, carried his experiments farther, and discovered, in his turn, that clay was also influenced by lime under the action of saturated steam, and that much more rapidly than when in the presence of sand alone, and that by adding to the two essential parts, sand and lime, a small portion of clay, a product possessing greater hydraulic and resisting properties could be produced. This is explained by the fact that during the process the clay combines with the silicic acid and forms a chemical compound, the analysis showing only silicates of lime, alumina and iron. It is claimed by the patentees that the preparatory treatment which the compound has to undergo is the surest guaranty of its stability, since the water-steam treatment is the test of its resisting power. If it emerges from the hardener intact, without cracks or blaze-marks, it is certain that all the lime has been completely slaked, and if it comes out in a hard, compact state, this is a proof that the silicate of lime has been formed, and that it will be henceforth proof against the effects of both climate and temperature. It must not, however, be supposed that, should any of the lime remain in a free state, the quality of the brick will deteriorate; on the contrary, it will combine gradually with the other materials, and the strength of the brick will increase with age. Another important point is that these bricks are necessarily homogeneous, *i. e.*, all the elements entering into their composition are uniformly distributed through the mass, and the mixture is, therefore, intimate and perfect. This is an essential condition of manufacture, as the binding of the grains of sand with the silicate would otherwise be irregular, and the finished brick would have no strength. A brick, therefore, which, when drawn from the hardener, is found to be uniformly hard and resisting, must of necessity be homogeneous, thus ensuring that it may be easily worked or even sculptured, as has been proved by experience. The preparatory process allows also of the introduction of various coloring matters, such as the ochres, and different mineral color bases, and these matters being intimately mixed with the mass, a variety of shades and tints may be obtained, and a scale of colors, not possessed by clay bricks, inaugurated. Besides, as the argilo-calcareous product is not fixed, it emerges from the hardener with the same shape as when taken from the mould, its surfaces remain perfectly parallel, and its edges and angles are sharp. From a sanitary point-of-view it may be compared to clay bricks, as it possesses the same degree of porosity. The following summary will be sufficient to show the properties possessed by the argilo-calcareous brick. It possesses absolutely regular contours, without contractions or deformations, and has even surfaces and sharp edges. It has a proper natural color, white or greyish, depending on the kind of materials used, or may be colored by employing different mineral coloring matters, chemically mixed with the mass. It has a pressure resistance of 440 pounds per square centimetre or about 2,816 pounds per square inch, and such resistance can be increased, if required, for certain special purposes. It is moulded by powerful mechanical means, and this permits of the production of various forms and mouldings. By reason of its composition it is perfectly hydraulic, and can therefore be employed for subaqueous constructions. Frost has no effect whatever upon it. It possesses the porosity necessary, from a hygienic point-of-view, for materials used in buildings, but this porosity can be reduced if necessary to practically zero. It is a bad conductor of heat. It can be easily cut with a trowel. Its composition is perfectly homogeneous and its density, with regard to the materials employed, is constant and regular. Its hardness increases with age, as in the case of cement. It forms with the mortar used for binding, which adheres not only mechanically, but also because of its molecular and chemical affinity, a single homogeneous construction or monolith, of great strength. It can be painted or varnished without being subjected to any previous preparation. It allows the interior coatings of plaster to be replaced by one ordinary thin-scraped application. It absorbs but a very small quantity of water and soon dries again. The brick can be used without previous moistening. It never foliates or throws out any of the soda or potash salts.

It has been stated in the foregoing that the argilo-calcareous brick is a form of hydraulic mortar hardened by steam under pressure. It would be, however, as well to formulate here certain distinctions bearing upon the materials used and their relative proportions. To make an ordinary hydraulic mortar, sand and cement, or slaked hydraulic lime, mixed with water, are generally employed. The sand is used in a moist state, and its chemical composition varies from clayey sand to quartz sand. Very fine sands are not recommended because they give mortars which adhere but indifferently to stones; large sands require a rich dose of cement, whereas medium-sized sands (the grains of which will pass through a sieve

having about 600 per square inch) are preferred. For the argilo-calcareous compounds the sand is used dry and hot, and its tenor in silica should be as high as possible. As for the size of its grain, the finest products are made from quartziferous sands of a very fine texture. In ordinary hydraulic mortar the sand plays a purely physical part solely as a resistant, inert matter, for the solidification of the mortar is only due, according to Vicat, to the hydration of the double silicate of lime and alumina. In the sand-brick the sand not only plays a physical part but a chemical part as well, by furnishing silica to the lime with which it is compounded, both of which, under the action of the steam, will combine together, forming the silicate of lime, which again forms the binding material of the mass. In so far as concerns the lime in ordinary mortar, it contains, as hydraulic lime, from 10 to 35 per cent of clay to every 65 to 90 per cent of lime (CaO), foreign matter, oxide of manganese, sulphate of lime, sand, etc. It is a complex body, but fixed, of a stable chemical combination, and which enjoys certain characteristics proper to it. The combined clay gives it its indice of hydraulicity in relation to the proportion of silica and alumina contained. In argilo-calcareous compounds the lime used is a fat lime, the richest possible in the oxide (CaO), and the clay is added in pulvurent form, uncalcinated, and therefore in a raw state. It might be said that this combination constitutes an hydraulic lime, but this is not so, for on the one hand the small proportion of clay would only furnish an indice scarcely equal to .03, and on the other hand the high temperature required to form this combination (1,200° to 1,600° C. = 2,192° to 2,912° F.) is lacking, seeing that the only calorific agent employed is steam. Nevertheless the products are positively hydraulic, which demonstrates that the part played by the clay is quite different. From the above it will be seen that the constituent mortar of the argilo calcareous compounds possesses properties different from those found in ordinary hydraulic mortar, which are made manifest through the special treatment to which the former is subjected. The difference between the two bodies is, however, made still more manifest if one considers the proportions of their various elements. In ordinary hydraulic mortar the lime, in the form of a paste, and the sand are, as a general rule, in the proportion of 1 : 2.5, and 1 : 3 and over for rich mortars. On the other hand, the water needed for the making of the lime into a paste of a firm kind varies, according to the quality of the lime, from 50 to 83 per cent, and one must add to this in addition the water necessary for making the mortar, the quality of which depends largely upon the nature of the sand and the percentage of lime, but which is comprised between 16 and 64 per cent. In the argilo-calcareous compounds the lime is used unslaked and pulverized in the proportion of 1 : 10, at the utmost, relatively to the sand, and it is only moistened with the quantity of water necessary to transform the mixture into a mono-hydrate, say about 30 per cent. Next the resulting mass receives a quantity of water equal to about 7 per cent of its weight. It will thus be seen that the two compounds are quite distinct. The first is finished upon its being mixed, and its setting occurs by the phenomenon of the air hydration of the double silicate of lime and alumina, whereas the second has besides to be compressed and submitted to the action of steam under pressure to harden and form the desired compound. The main characteristic feature of Meurer's process is the use of dry materials, allowing one to apportion exactly and mathematically the requisite additional water on the one hand for the slaking of the lime during the mixing, and on the other hand for the moistening of the mass in order to render it sufficiently plastic to be moulded. Another point in the process which, combined with the first, constitutes the patented invention, is the simultaneous use of hot sand and hot water in the mixing, which has the result of facilitating and hastening the hydration of the lime, besides favoring the setting after moulding, by causing a veritable crystallization. From another aspect, the characteristic feature of Girard's process is the addition to the mixture of sand and lime of a very small proportion of clay, the presence of which has the effect of increasing the plasticity of the mass, thus facilitating the moulding, thus rendering its scope of application greater, and, on the other hand, producing a body which, when subjected to the action of steam under pressure, is readily attacked by the hydrate of lime. The latter property possesses the economic value of reducing by one half the amount of steam required in the stoving or hardening as compared with other lime and sandstone processes. The mortar prepared under these two joint processes furnishes mouldings which possess great resisting powers when taken from the press, and which can be immediately steam hardened when they solidify completely and in such a manner that they may be used directly afterwards for building purposes. This solidification is brought about by the combination of the hydrate of lime with the silica and alumina of the clay into a double silicate of lime and alumina, which cements the grains of sand together, and thus forms a homogeneous block of stone of fixed and unalterable composition, and which may be used in ordinary buildings or for submarine work. — *Stone Trades Journal.*

[To be continued.]

Archæological Research in California. — Prof. Martin Luther D'Ooge of Boston is to organize a California branch of the Archæological Institute of America, the object of which is to promote and direct archæological investigation. The institution, founded in 1879 by Prof. Charles Eliot Norton of Cambridge, has now fourteen societies in active operation. — *Exchange.*

BOOKS & PAPERS

NOT many people could write a book of two hundred pages on the subject of Spirals,[1] and still fewer could make such a book even tolerably readable; but the accomplished author of "*Old Touraine*" has not only done this, but has produced an extremely interesting little volume. Even those who do not agree with his theory that various artistic spirals are based on natural forms, to say nothing of his "discovery" that Leonardo da Vinci applied his biological learning to the design of the spiral staircase at Blois, will find his arguments instructive and delightful, while the examples which he illustrates contain, at least, charming suggestions.

Mr. Cook disarms criticism at the outset by confessing the superficiality of his knowledge of the various sciences concerned with spirals, and, predicting that "every specialist will delightedly correct those errors which occur in ground familiar to him," he calmly leaves detractors to their enjoyment.

That the field of spiral affinities is an extensive one may be gathered from the index of the book. Under the letter R we find indexed, for example, Rabbits, Rabelais, Rata, Ravaisson-Mollien, Ravenna, Red Crag Sea, Renaissance, Richter, Rocky Mountains and Rodin; while under C, is included a range of biography from Cæsar Borgia to Cormack McCarthy, and of art from Curves in Building to Coffin-screws. When we add to this that six languages are used in expressing the various thoughts to which the readers' attention is invited, the comprehensive nature of the work will be sufficiently obvious.

To architects who are a little rusty in Greek and Latin, and need a dictionary even for German and Italian, and to whom the observation that contact parastichies may possibly be log-spirals which intersect orthogonally conveys but a feeble meaning, the most interesting part of the book will be the description of the work and character of Leonardo da Vinci, as shown by his sketches and manuscript writings, and the argument for attributing to him the spiral staircase at Blois. It is known that Leonardo came to France, at the invitation of Francis I, early in the year 1516, and died, three years later, at Amboise, twenty miles from Blois. The new wing of the château at Blois, containing the famous exterior staircase, was in process of construction when he arrived in France, and the records show that the first payments for the work were made, out of the royal treasury, in July, 1516, a few months after Leonardo's arrival in France. Mr. Cook says that the staircase might perfectly well have been added to the design after the wing was begun, which is true enough; but such important additions are not usually made to a building, at least under the care of such a renowned artist as Leonardo, without leaving any trace of the occurrence in history. Mr. Cook says that the statues at the entrance of the staircase are characteristic of Jean Goujon, and thinks that he "may well have been called in to put the finishing touches to a structure which a greater than he had originated." Jean Goujon was not born until after the death of Leonardo, and it is difficult to see why he should not have been called in to put finishing touches to other people's work, as well as Leonardo's.

The other evidence upon which Mr. Cook appears to rely for supporting his theory that da Vinci was the designer of the Blois staircase seems to consist in the observation that it forms a left-handed spiral, while Leonardo was known to have been left-handed; and that the arrangement of the spiral is similar to that of the shell of *Voluta vespertilia*, a Mediterranean mollusk, which da Vinci, as an enthusiastic student of nature, would probably be familiar with. He thinks, also, that the left-hand twist "satisfied Leonardo's practical sense of fitness," because it was easier to walk up such a stair, and because it gave a sense of hospitality, as the host of the mansion "could walk down it with welcoming right hand outstretched to the ascending guest, who was in his turn helped on his ascent by keeping his own right hand on the side-rail."

Even supposing that the host found it easier to hold out his welcoming right hand to his guests while descending a left-hand spiral, it seems as if the temptation to the guest to keep his right hand churlishly on the rail, instead of holding it out in response to the welcoming hand of his host, might offset the other advantage. As to the resemblance between the staircase and the shell of *Voluta vespertilia*, it would be difficult, probably, to find any spiral staircase which would not resemble some natural form, and it is hardly conceivable that an architect should go to a shell for the inspiration of a staircase, instead of laying out the treads and risers conveniently. The details of the staircase, of course, bear no resemblance to anything about a shell, nor, it may be remarked, do they bear any resemblance to the coldly classic forms which da Vinci is reputed to have preferred. As to the probability, apart from internal evidence, that Leonardo, within a few months after his arrival in France, began the execution of an important architectural work, as an addition to some one else's design, and in a style completely unfamiliar to him, without attracting the attention of any, the reader is likely to draw his own conclusions from the fact that he was unquestionably

[1] "*Spirals in Nature and in Art*": A Study of Spiral Formations Based on the Manuscripts of Leonardo da Vinci, with Special Reference to the Architecture of the Open Staircase at Blois, in Touraine, now for the First Time Shown to be from his Designs. By Theodore Andrea Cook, M. A., F. S. A. With Illustrations. New York: E. P. Dutton & Co. 1903. Price $2.50.

the most noted artist of his age, that he was over seventy years of age and in feeble health, when he came to France; that he is not known to have done any artistic work for his royal patron, much less anything so laborious as the hurried execution of the great Blois staircase; and that in less than three years after his arrival, he died, as the legend relates, in the King's arms.

IT is one of the commonest of occurrences that the reviewer has brought to his attention at the same time two or more books dealing with the same subject, so that there is nothing unusual in the almost simultaneous appearance of two books that deal with wood, one published in London, the other in New York. Apparently, in each case, one of the objects most clearly had in view was to give in simple form instruction that might lead to the identification of woods that are to be found in the open market and their consequent employment for those specific uses for which Nature had adapted them.

To a certain degree the methods of treatment adopted by the authors are similar but not identical, and as Professor Snow's book[1] is devoted almost absolutely to the consideration of the woods of the United States it may be said that his book affords a very desirable supplement to the more comprehensive one prepared by Professor Boulger.[2] In every way the former is an admirable piece of bookmaking, well planned, systematically arranged, the system being adhered to from cover to cover, well printed and above all illustrated in a most interesting and intelligent manner, for the possibilities of photography and photo-engraving have been availed of to very sensible purpose.

In his modesty Professor Snow does himself an injustice when, in his preface, he speaks of his work as an "untechnical presentation," for to us it seems technical in a very satisfactory and workaday manner. A better idea would have been conveyed if he had used the term "non-botanical," for he has made little use of the technical terms ordinarily found in books on botany and dendrology, and this it was comparatively easy to do as he was not concerning himself with the manner of plant growth but rather with the aspect and use of plant growth after it had reached the stage of the manufacturer's raw product. This absence of scientific phraseology and botanical terminology, together with the systematic and coördinated arrangement of statement describing the several varieties and species of wood, gives the book an extremely workmanlike and usable air. But it is the character of the illustration that lends special value and interest, for, as the illustration here annexed shows, the conception has been to exhibit upon each plate a view of the growing tree, which gives the general shape and shows how the foliage masses, the leaf and fruit, a fragment of the trunk and bark at a larger scale and a section of finished wood, sometimes transverse, sometimes longitudinal.

As a matter of fact, the illustrations are not absolutely comparable with one another, since sometimes the tree is shown in foliage and at others with leafless branches, and this suggests that it would have added materially to the value of the book for certain purposes,— for "nature study" and for "timber running," for instance,— if the same tree had been shown on each plate in leaf and with branches bare.

Professor Boulger, on the other hand, being Professor of Botany and Lecturer on Forestry in the City of London College, quite naturally approaches his task from the botanical side, and though his second Part is in matter and arrangement fairly analogous with Professor Snow's descriptive tabulations, he gives in Part I a large amount of interesting information as to the growth and structure of woods which, as these matters have a bearing on the manner in which manufactured woods wear, is entirely in place in such a book, and as these chapters are illustrated with admirable cuts showing at large scale the sections of different wood growths at different stages, one gets a very satisfactory idea of the vascular systems of large plants and no longer wonders why woods shrink, warp, twist, crack and split.

Plate 10. Hickory. From "*The Principal Species of Wood.*"

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[1] "*The Principal Species of Wood*": their Characteristic Properties. By Charles Henry Snow, C. E. Sc. D., Dean of the School of Applied Science, New York University; M. A. S. C. E., etc., New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903. Large 8vo. Price $3.50.

[2] "*Wood*": a Manual of the Natural History and Industrial Applications of the Timbers of Commerce. By G. S. Boulger, F. L. S., F. G. S., F. R. H. S., A. S. I. Professor of Botany and Lecturer on Forestry in the City of London College, and formerly in the Royal Agricultural College; Author of "*Familiar Trees*," "*The Uses of Plants*," etc. London: Edward Arnold. 1902. Longmans, Green & Co., agents for the United States.

In other chapters he gives very sensible and understandable information concerning the defects of woods, and the animate life that attacks them; concerning the selection, seasoning, storage and durability of woods and the best of the methods of impregnation and seasoning; concerning the uses of woods,— listing under the heads of ship-building, mining, building, furniture, and so on, the woods that are most commonly used in the several industries, often hinting at the reasons for their selection: and here can be found many a bit of curious information as, for example, that "willow is still occasionally used for flooring" because it does not splinter, and that Grinling Gibbons largely used linden wood for his carvings. Another short chapter is devoted to the present condition of the timber supplies in different parts of the world, and it is full of warnings and forebodings, expressed or implied. The first Part closes with a short chapter on testing woods and the following two hundred or so pages of the second Part are devoted to descriptions of some seven hundred and fifty varieties of woods used by man in different parts of the world. Professor Boulger says that although he catalogues only 750 varieties, "there are, undoubtedly, several thousand woods used in various parts of the world," a statement which does not seem at all unlikely as we note that Professor Snow in his book states, on the authority of Mr. B. E. Fernow, head of the United States Division of Forestry, that there are in the United States 495 known varieties or, as Prof. Charles Sargent puts it, 422 distinct species.

As the Englishman's book undertakes to cover the entire world his list of woods is the more numerous and, perhaps, because of this it was not possible for him to adopt the semi-tabular form of descriptive statement which makes the American's so perspicuous.

One of the chief aims of each writer has been to produce a book that would have a use in what we may call commercial life and so each has been careful to state the uses to which a given wood can be put. But in commercial life we fancy the problem less often presents itself to the intending user of wood thus: "Hello, here's a piece of wood; when I find out what it is then I can discover what use best to put it to," but rather thus: "I have got a certain article to make, now what is the best wood to use?" Consequently, an indexed tabulation of manufactured articles showing the wood most suitable for each case would have added materially to the working value of each book. In a considerable degree, Professor Boulger's chapter on the "Use of Woods" covers the point, but what would be more useful still is a complementary index or tabulation which could easily be complied from the statements that both authors give under the heading "Use."

SOCIETIES

THE ENGINEERS' CLUB OF PHILADELPHIA.

AT the last meeting Mr. Henry G. Morris read a paper on "A Consideration of the Gaseous Fuel Problem." After tracing the history of the use of artificial gas from the first efforts to evolve it from coal, about 1789, and showing the popular prejudice against it that had to be overcome in the earlier years of its use, Mr. Morris took up the question of the application of gas as fuel. The use of crude fuel for domestic purposes, with all the disadvantages of comparatively expensive handling, the lack of economy from burning it in ordinary stoves and heaters, the labor involved, and finally the cost of disposing of the refuse, naturally lead to a consideration of conditions which might exist with an adequate supply of fuel in the form of gas. That the consumption of gas for fuel is increasing is shown by the fact that some 40,000 gas-stoves are now reported to be in use in Philadelphia. It is perhaps a safe assumption that ten times as much fuel is required for heating and cooking as is required for lighting, so that there would appear to be a very large field of operations to be covered by the producer of a gaseous fuel.

Development of the by-product of coke-ovens would seem to offer the solution of the problem of furnishing gaseous fuel at a low rate of cost, and methods of distribution to comparatively long distances make it possible to locate the producing plants at convenient geographical and commercial points. That there is a great waste of fuel where the gas from the ovens is not utilized is shown by figures given for the bee-hive ovens between Altoona and Pittsburgh. These ovens probably make 20,000 tons of coke per day, from which about 100,000,000 cubic feet of gas discharge into the air. This gas, if converted into power through gas-engines, would represent 5,000,000 horse-power-hours, or the effort of about 104 gas-engines of 2,000 horse-power each. Manufacturers of gas apparatus are now offering to guarantee the production of a horse-power-hour for one pound of fuel — a result not at present attainable through the medium of steam-engines and boilers, except by the most complex type of engine. Mr. Morris exhibited and explained in a general way some slides showing a number of large plants for the manufacture of gas and coke. Among these was the large plant at Everett which, properly speaking, is a coke and chemical works producing ammonia, coal tar and derivatives; the gas being considered a by-product.

J. O. Clarke, *Secretary.*

Medals for Sargent and Abbey. — The German Emperor has conferred gold medals on John S. Sargent and Edwin A. Abbey, the American artists. — *Exchange.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

RHODE ISLAND STATE BUILDING, LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO. MESSRS. THORNTON & THORNTON, ARCHITECTS.

THE late Bruce Price's first contribution to the *American Architect* was published in August, 1876, and during the next ten years he was a frequent and valued contributor; but unfortunately in later years his contributions have been less frequent than was desirable, so that much of his later and most interesting work has never been recorded in these pages. It has seemed worth while, therefore, to publish in this issue a considerable number of drawings which represent the work done by this distinctly able man who among other good qualities had, perhaps, the surest grasp on the problem of designing a high building.

LAW BUILDING, 259 FIFTH AVE., NEW YORK, N. Y. MR. BRUCE PRICE, ARCHITECT.

DESIGN FOR A CITY HOUSE. MR. BRUCE PRICE, ARCHITECT.

"THE HENDRIK HUDSON," YONKERS, N. Y. MR. BRUCE PRICE, ARCHITECT.

Additional Illustrations in the International Edition.

OFFICE-BUILDING, WASHINGTON, D. C. MR. BRUCE PRICE, ARCHITECT.

INTERNATIONAL BANKING & TRUST CO.'S BUILDING, BROADWAY AND CEDAR ST., NEW YORK, N. Y. MR. BRUCE PRICE, ARCHITECT.

ST. JAMES BUILDING, NEW YORK, N. Y. MR. BRUCE PRICE, ARCHITECT.

MURAL MEMORIAL TABLET. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.; MR. J. MASSEY RHIND, SCULPTOR.

SKETCH FOR A NEW YORK OFFICE-BUILDING. MR. BRUCE PRICE, ARCHITECT.

MISSOURI PACIFIC BUILDING, ST. LOUIS, MO. MR. W. ALBERT SWASEY, ARCHITECT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

ARCHITECTURAL INSTRUCTION AT CORNELL.

Ithaca, N. Y., July 3, 1903.

To the Editors of the American Architect: —

Dear Sirs, — I am quite behind the times with my technical reading and for that reason have only now gotten around to the *American Architect* of June 6, wherein is your editorial comment on the alternative course in Architecture at Cornell.

I do not know how the "newspapers" came to take up such a matter, because it has never been published except in the regular Announcement of Courses issued this spring as supplementary to the general University Register, and if they got it from that, there must have been gross carelessness or deliberate malice behind the interpretation in order to give the impression that you comment upon so seriously, and so unfairly to the College. I am mailing you under separate cover a copy of the Announcement of Courses referred to and you will find an outline of the Courses offered in the College of Architecture on pages 98–103.

Your editorial convicts you of knowing practically nothing in detail of our curriculum and entrance requirements, and for that reason I beg that you will pardon me if I ask you to go into the matter with me at some length. I shall be as brief as possible and shall leave volumes unsaid, but I should like to touch upon a few points that you apparently ought to know in order to be fair to us.

First. — Our entrance requirements in mathematics and language are higher than for any other school of like kind in this country. We require, for entrance, plane and solid geometry, elementary and

advanced algebra, and plane and spherical trigonometry. We also require, for entrance, as much language as is taught in any other school of architecture that I know of.

Second. — In our regular course (Course A) that has been established for several years, we require five recitations a week throughout the first year in analytic geometry and calculus. Most of the older schools teach analytic geometry, but only two of the older schools besides Cornell teach any calculus to architects.

Third. — The descriptive geometry of which you make special mention in your criticism is a thing that we regard as both elemental and fundamental. It lies at the foundation of all projective drawing, and we give it in the first half of the first year, whereas I note that at least one of the other leading schools for some reason postpones it until the senior year.

Fourth. — Aside from the question of pure mathematics we teach fully as much applied mathematics in the way of mechanics, strength of materials, etc., as any of the other schools; and in that side of the work relating to the ordinary details of office practice such as working drawings, construction details, etc., we give much more than any other school; and, furthermore, *all* of our students, regardless of the direction in which they may desire to specialize, are required to take all of this branch of the work including the mechanics, etc. The head of one of the leading schools of architecture in a personal conversation not very long ago, requested me to give him a description of this part of our work. While complying with the request, I noted a growing nervousness that finally reached a climax, and he blurted out with the greatest of impatience, "But, Martin, that isn't *architecture*. It is all right enough in its place, but its place is in the office and not in the school." He then went on to say that the schools should teach the *Art* of Architecture and let the men learn these purely practical and more or less routine things in the offices after leaving college. To a certain extent he was right. Until within a few years architecture has been taught in this country as a branch of engineering rather than as a fine-art, but in the natural and inevitable reaction the tendency in the modern schools is toward the other extreme. Here at Cornell we lay great stress upon the training in design, but we hold that no design can be good unless founded upon sound construction, and for that reason try to teach both sides of the work adequately. Our entrance requirements had to be materially raised to give us the time, but we are satisfied to let the results speak for themselves.

Now as to the Alternative Course, what it means and the reason for it: —

All of our students in both the old course (Course A) and in the alternative course (Course B) must pass the same entrance examinations, embracing mathematics as before mentioned. Among the men thus entering and passing the higher algebra, trigonometry, etc., we have occasionally found one who showed exceptional ability in drawing and design, but was utterly unable to cope with the mysteries of calculus. (This, of course, does not in any way take into account the many who fail in everything or simply get through on the narrowest possible margin.) In the case of these exceptional men there has been no alternative but to drop them or, finally, to make exceptions in their cases and allow them to substitute something else for mathematics after having tried for several years to do the mathematics (calculus). All of this naturally caused a great deal of trouble for the student and after practically wasting one-third of his time for two or three years trying to do his mathematics, he would still be obliged to do an equivalent amount of work for substitution, and it must almost inevitably result in his requiring an extra year for graduation.

By eliminating the analytics and calculus from the course we give this man a chance at the very beginning to make a choice, and we show him a way to graduate with his class in the regular four years. It was necessary, however, that this alternative course should not be made too easy and attractive, if it were to serve its real and legitimate purpose and save the men who were strong enough in design to offset their weakness in mathematics. For that reason we very materially raised the requirements for graduation in design in this course. The regular student in Course A must do all the problems in design issued to his class through three terms of first-class design, and among these he must render all of them satisfactorily and bring not less than seven of them up to a "mention" grade. In the alternative course (Course B) the student must do all of the problems in first-class design issued through a period of four terms, must render all of them satisfactorily, and must bring not less than fourteen of them up to "mention" grade. When I tell you that there was not a student in the graduating class of this year who had the requisite number of "mentions" to graduate on the basis of Course B requirements, you may understand that this alternative course is not the makeshift catering to incompetence that you seem to have imagined from the "newspaper" reports.

I am sending you also a copy of our 1903 book showing the work of the College. As this will probably not go out until early next week you will not get it immediately, but I wish that you would examine it carefully and note somewhat of the standard and the scope of our work. We believe that our standards here are high and we mean to keep them going up rather than down. Our very high entrance requirements enable us to give a half year more technical work than any other school, and that, too, without any sacrifice of the so-called general-culture studies.

I must again apologize for taking so much of your time, but I trust that you will now understand us better and that you can see your way clear to correcting your June 6 criticism. Thanking you for any favor in that direction, I am yours very truly,

CLARENCE A. MARTIN.

NOTES & CLIPPINGS

ANECDOTE OF R. M. HUNT. — Mr. Hunt was in Paris one time on a visit, and walking with a French architect through the Louvre, when the two chanced to meet a Londoner whom his friend knew. Mr. Hunt was introduced, but the Englishman did not catch the name. After some conversation, partly in French and partly in English, Mr. Hunt chanced to speak of his New York office, when the Londoner exclaimed: "I say, but you are enterprising! So you have a New York office, too?"

"Why on earth shouldn't I?" replied Mr. Hunt with such quickness that it almost cut the Britisher short.

"Yes! yes! But isn't it a bit odd that a Frenchman should have a New York office? Don't y —"

"Frenchman! Whew!" and Mr. Hunt drew in his breath, as if to whistle. "My dear fellow, I'm a Yankee, dyed in the wool, a yard wide, a full fledged, brimful, running over, from my hair down, from my soles up Yankee — an American — an American Yankee!"

The words followed each other with such cyclonic force that "it blew away the London fog," as Mr. Hunt expressed it in telling the story afterward. — *N. Y. Tribune.*

DANGERS TO NIAGARA. — The nineteenth annual report of the Commissioners of the New York State Reservation at Niagara has been received. It is the longest document ever issued by the Commission, as well as the most interesting. The report says that the danger which threatens the integrity of Niagara Falls is not merely theoretical, but is a very substantial reality and proceeds from three sources: *First.* — From the power companies now in operation on the American side, which take from the Niagara River between seven and eight million gallons of water a minute, or about six per cent of the total flow over the falls. *Second.* — From the construction of commercial and drainage canals, which will divert the waters of the Great Lakes from their natural outlet by way of the St. Lawrence system to that of the Mississippi. The Chicago drainage canal, designed to take 600,000 cubic feet a minute from Lake Michigan, is a case in point; and among other suggestions which have been advanced is one for a canal across the State of Wisconsin and from Lake Michigan to the Mississippi, and another for a canal from Lake Superior at Duluth to the Mississippi. *Third.* — From Canadian enterprises, like the Welland Canal and the proposed canal connecting the Georgian Bay with the Ottawa River; or, to come nearer to Niagara, from the Ontario Power Company and the Canadian Niagara Power Company, whose works are now in course of construction within sight of our reservation, and from a third Canadian corporation, to which the Commissioners for the Queen Victoria Niagara Falls Park have recently granted a similar privilege. The report has a chapter on the Canadian park, in which it says: "Great as has been the regret of this Commission at the action of the past New York Legislatures in permitting the diversion of water from the falls, a keener regret has been caused by policy of the Canadian Government, for the latter has not only granted the right to subtract a large volume of water from the falls, but it has also permitted the power companies to invade the Victoria Park and erect their unsightly structures in full view of both the American and Canadian reservations." — *N. Y. Sun.*

ST. LOUIS FAIR HORSE-POWER TO BE FORTY-FIVE THOUSAND. — An idea of the immense amount of power to be used at the St. Louis Exposition may be obtained from what Thomas M. Moore, chief of the department of machinery, told about it at the Manhattan lately. Said he: "At the Chicago Exposition 12,000 horse-power was used in running the whole plant, at Buffalo 11,000 horse-power was required, but St. Louis will use 45,000 horse-power. To run the cascades and water features it will be necessary to pump 90,000 gallons a minute, as against Buffalo's 7,000 and Chicago's 4,000 gallons. The pumps for the cascade, which is 50 feet wide at the top, will have to pump against a head of 150 feet. The Exposition will make its own gas and briquettes for fuel. It is the first to do this. The St. Louis Fair will use more power for incandescent lights alone than was required to light the whole Chicago Exposition; 15,000 horse-power will be devoted to this purpose. The extent of the St. Louis ground is 1,200 acres, as compared with the 800 of Chicago. A comparison of these figures will show that the magnitude of universal expositions is constantly growing." — *N. Y. Tribune.*

STATUE OF WASHINGTON FOR ST. PAUL'S CATHEDRAL. — At a meeting of the Executive Committee of the Pilgrims' Club July 15 a committee was appointed to give effect to the recent suggestion that a statue of George Washington be erected in London. It was decided that the subscriptions should be entirely confined to British subjects. Archdeacon Sinclair in submitting the plan to the club, said: "Englishmen have at last fully recognized the great qualities of Washington I feel assured that nothing will be more popular in this country than such a tribute to that great man of English birth [*sic*], who has done so much for the world's history, not only for the young nation across the sea, but for Great Britain as well." Archdeacon Sinclair announced that he was authorized to offer a place for the statue in St. Paul's Cathedral. — *Exchange.*

S. J. PARKHILL & CO., Printers, Boston, U. S. A.

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT

No. 255 SATURDAY, AUGUST 1, 1903 Volume LXXXI No. 1440

FOR BEAUTY'S SAKE.

A WOMAN'S gospel should be, to be as cleanly, wholesome and lovely in body as in mind. Nothing will more readily improve her health and beauty than the thorough cleanliness and increased circulation resulting from the daily use of a shower-bath. Life itself takes on added pleasures from the tonic effect of the daily shower. It invigorates, renews vitality and strengthens the heart action, by increasing the surface circulation, all of which stimulate the appetite and improve the general health.

Beauty depends more upon health than anything else, and one of the best methods of gaining and retaining perfect health is to bathe, and bathe often, once a day always, but twice is much better.

Those of healthy or robust constitution may take a shower-bath as cold as they like, but it should always be followed by a brisk "rub-down" with a coarse towel until the skin fairly glows. It should be noted, however, that the lower the temperature of the water, the shorter should be the duration of the bath.

Hot-water tub-baths are debilitating, and should never be taken unless followed by a cold shower, which is the best safeguard against the contraction of a cold.

The "Standard" Portable Shower-bath is in daily use by thousands who have learned the value of physical culture followed by a shower. All agree as to the permanency of its strengthening and invigorating effects.

No bathroom is completely equipped if a shower-bath is absent. The "Standard" Portable Shower is an ideal fixture for those who live in rented houses or apartments. It is, as its name implies, portable, easily put in place or removed. It is inexpensive when compared with the permanent showers, and though portable, its operation is just as efficient. If you move it is not a part of the permanent plumbing to be left for the next tenant.

To be most beneficial water from a shower must fall from a distance and with force. The "Standard" Portable Shower fills these requirements exactly. The rubber tubing, by which the shower is supplied, is 6 feet in length, permitting the shower to be hung at almost any height desired. The sprinkler is of the needle-spray type, throwing a fine spray of water, resulting in a slightly irritative but extremely pleasant effect upon the surface of the body. Yokes, sprays, hand sponges, etc., are all but tame substitutes for a genuine "Standard" shower-bath.

Women frequently object to the use of a shower-bath on account of the wetting of the hair. In order to overcome this prejudice, we furnish, free of charge, with each shower, a rubber cloth cap, of the highest grade and quality, through the use of which the wetting is obviated. To most women the shampooing of their hair is a tedious and vexatious task, but not so if they use a shower-bath, as a much more satisfactory shampoo may be had in five minutes with a shower than in half an hour without. The "Standard" Portable Shower is worth all it costs for this purpose alone.

The "Standard" Portable Shower is supplied with patent needle-spray, with improved air-valve; also best white rubber supply-tube with patent "holdfast" which readily slips on or off the nozzle of any regular bath faucet. The fixture is of rigid construction and made from the best brass tubing, highly nickel-plated.

The curtain is of superior quality rubber cloth, full size, and attached to the shower with improved nickel-plated brass hooks.

All material entering into the construction of "Standard" Portable Showers is of the highest quality, and each one is sold with our absolute guaranty covering workmanship and material.

No bathroom is completely equipped without some style of shower. To those who desire the more elaborate permanent fixtures we call attention to our line. We make a specialty of building showers to order, any shape or size, and to fit any space for any purpose.

The luxury and pleasure of a shower-bath is a revelation to those not already acquainted with its charming delights.

STANDARD SANITARY MFG. CO.,
PITTSBURGH, PA.

WHERE TO USE MASON SAFETY TREAD.

APPLY it to interior stairs, whether of wood, iron, cement, or stone. For a tread surface it is better than any of these materials, safer and more durable, neat, odorless and noiseless. Wood, slate and marble wear hollow and shelving; iron becomes dangerously smooth in a short time; rubber gives off a disagreeable odor, and wears to a ragged condition, when it is likely to trip you up. Mason Safety Tread protects the stairs to the extreme edge, and being all metal is good for many years' wear.

Apply it to exterior stairs and to the worn borders of sidewalk lights. It does not become slippery when covered with frost or light snow, hence avoids the use of the awkward and cumbersome storm steps so common in northern cities.

Apply it to worn stairs of any kind, and make them level and safe. We'll tell you how.

Apply it in vestibules, upon thresholds, elevator-landings and inclined passages in stores.

Embedded at intervals in artificial stone sidewalks and between the lenses of vault lights, it serves a useful purpose, especially upon an incline.

It is the safest and most durable material known for use upon the steps of railroad and street cars.

It is needed wherever there is a surface which it is desirable to render non-slippery.

The Mason Safety Tread is extensively used in England, France, Germany, and in thirty-eight States of this country, including all the large cities. It is endorsed and specified by the best architects and engineers, and used by the owners of good buildings.

The United States Government is a large user in public buildings and upon the decks and ladders of all the vessels of the new navy.

The elevated railroads in New York, Boston and Chicago are large users, as nothing is so good and so durable for protection to the stairs of their stations, whether of wood or iron.

The New York Rapid Transit Subway Commissioners are embedding this Safety Tread in the front of all cement stairs in their stations.

The railroad depots in many large cities have their stairs equipped with Mason Safety Tread.

Several hundred school-houses, court-houses, and other municipal and county buildings are equipped with Mason Safety Tread.

Owners of factories, bank and office buildings, and all the principal department-stores use Mason Safety Tread and believe in it, for it saves wear and prevents accident.

Thousands of steam and street railroad car-steps on the principal lines throughout the country are covered with Mason Safety Tread, because it is the best and cheapest provision against slipping.

Steps in power-houses, often made slippery by drippings of oil, are safe when protected by Mason Safety Tread, because oil has no effect upon its grooved and leaden surface.

Mason Safety Sidewalk Lights and Coal Hole Covers protect against the danger of slipping in the same manner as the Mason Safety Tread. They are made without pegs or knobs, and furnish absolute security.

STEEL FURNITURE AND OFFICE EQUIPMENT.

THE LATEST CONCEPTION OF THE BERGER MFG. CO.

In bestowing upon their latest and most popular creation the name "The Armor Plate of Modern Business," those famous artificers have made a most happy selection and certainly a more fitting one could not have been chosen from among the hundreds of titles of effective suggestions for their latest effort in metallic construction than that typifying proof against destruction of valuable papers, etc., under any and all conditions.

Steel Vertical Letter-filing Cabinet as depicted on page xvi is of graceful outline, and has that character of individuality which stamps it as having been wrought out by the most skilled workmen. The Berger Mfg. Co. prides itself upon employing only those who have been tried and tested at the bench or before the machine, and not until he has demonstrated to the full satisfaction of their superintendent that he is fit for the position does a mechanic secure employment at this concern's great factory.

"Upward and Onward" has ever been their motto, and not content to let well enough alone each succeeding season has shown the results of the ideas gathered in the preceding. The new line shows the same steady advancement that has kept the Berger Mfg. Co., Canton, O., in the forefront of America's great Steel Specialty manufacturers.

In the face of reputation already enjoyed by this firm, and fresh laurels which it is adding from day to day, it seems unnecessary to caution the enterprising merchant to grasp the first opportunity to place their goods in stock and also order in good time.

MECHANICAL AND ELECTRICAL EQUIPMENT OF A COTTON-MILL.

The mechanical and electrical equipment of the cotton-mills of the Davis Mill Co., at Fall River, Mass., is in many ways exceptionally up-to-date, including a fan-and-heater system of heating and ventilation, induced-draft in place of a chimney and electrical motor-drive throughout. To provide flexibility in the boiler plant and insure against shut-down, the induced-draft plant has been installed in duplicate. Two 7-foot blast-wheels, running in three-quarter, steel-plate housings, are driven by centre-crank, horizontal engines. The fan-wheels are overhung in the housings and are furnished with special, wide, water-cooled bearings. The engines themselves are provided with extended shafts upon which a pulley is mounted between each fan bearing the respective engines. These pulleys are in reality the flanges of the couplings of the two parts of the shafts, the belts running directly on the flanges. They are used for driving the economizer scrapers.

The air connection between the fans contains a flat swinging damper, which is so arranged that either fan can be shut off and the other run separately if desired. The outlet connections are likewise provided with dampers and the operating attachments are so placed that both can be changed at once by hand. The engines receive steam at eighty pounds and are furnished with a balanced valve which can be used in connection with a damper regulator.

The heating-plant of the Davis Mills is a duplicate of that installed at the Arkwright Mills some years ago. It consists of a large exhaust-wheel drawing air through a steam-pipe heater. The fan-wheel is provided with one tight and two loose pulleys and the engine has an extra wide, flat-face fly-wheel for shifting the belt. A second belt connects the fan pulleys with the line-shafting of the mill. This arrangement makes it possible in the summer-time to run the fan from the line shaft, thus taking advantage of the economy of the large mill-engine, while in the winter when the exhaust of the fan-engine can be utilized in the heater, or at night when the large engine is not running, the fan is driven by the fan-engine.

The heater is built up of 1 inch pipe erected on case-iron sections which rest at one end on ball bearings to allow for expansion and contraction. It is so arranged that the exhaust steam from the engine can be used entirely in one group of sections, making it possible to condense all the exhaust before it is necessary to use any direct steam, which is added at a reduced pressure when necessary. The outfit also includes a Kendall receiving-tank, with a water-gauge and a safety-valve, and a duplex Worthington steam-pump. The heating-apparatus will heat the mill to seventy degrees Fahr. when the temperature outdoors is zero.

The electrical equipment consists of two belted direct-current generators, one of 50 kilowatts and one of 75 kilowatts, operating at 125 volts, no load, and compound-wound. These generators supply current for lighting and for a 27-horsepower motor and one of 43 horse-power. The oiling devices of the motors are so arranged that they can be hung from the ceiling. The above apparatus has been furnished by the B. F. Sturtevant Co., of Boston, who also designed and constructed the heating and ventilating and mechanical draft plants.

DIXON'S PIPE-JOINT COMPOUND.

Dixon's Graphite Pipe-joint Compound has been on the market now more than twenty years and in that time has fully demonstrated its tremendous superiority over red lead for the purpose intended.

The reason for this superiority lies in the facts that graphite is a lubricant, and it does not form with the oil a hard, brittle compound as red lead does. When Graphite Pipe-joint Compound is used, each joint may be made up on an average of half a turn more than with red lead, and this is simply due to the lubricating quality of the graphite.

After a short time the mixture has hardened into a tough, elastic, leathery mass, instead of a hard, brittle one, as in the case of red lead, and when it is desired to take the joint apart, this yields at the application of very moderate force. The compound may be used wherever red lead is used, and in other circumstances where red lead is not at all suitable, as on gaskets.

This compound rubbed on the surface of gaskets enables them to be removed easily, so that they may be used again, thus effecting a considerable saving. *Bolts inserted in green woodwork covered with it are prevented from rusting*, and so are easily removed. Tap bolts may be made to fit very tightly and yet be put in and taken out without danger of twisting off the heads.

The ground surface of water-tube caps is kept in prime condition by its use. The manufacturers of this type of boilers are large users of it. Ground face-flanges are now largely used. A thin coating of Pipe-joint Compound on these prevents rusting and adhesion.

In general, wherever you have any surfaces which are in contact, and where you don't want them to stick, use Dixon's Pipe-joint Compound.

Although the cost of Pipe-joint Compound for use in any one establishment may not be a very large item, yet economy even in small things should be practised. Red lead costs nearly twice as much as Dixon's Pipe-joint Compound, not by weight, but by volume. A mixture of red lead and oil is about four times as heavy as a similar mixture of graphite; hence, to perform the same service, four times as much by weight must be used. There is also a great saving in another way. Mixtures of red lead and oil get too hard for use, if not used shortly after mixing, and have to be thrown away. This does not occur with mixtures of graphite and oil. Simply return what is not used to the package and cover with a little oil or water and it keeps indefinitely.

This is a material worthy of your attention and it will save you dollars and no end of trouble.

JOSEPH DIXON CRUCIBLE CO.,
Jersey City, N. J.

TIN ROOFS.

"You'll find, m'son, that things come out about even in this world, whether you are the man who puts the roof on or the man in the revolving chair underneath it. Tin that costs less is worth less, and sometimes worthless. Don't be deceived by looks, because looks, even in tin, are only skin deep, and are deceiving.

"Which reminds me of Jonas Darby, or rather, of Darby's little girl, Polly.

"Polly was keeping store, the way a kid will, and selling lemonade at so many pins a glass. I was going past the house and saw her stand out by the front gate. I just stopped to jolly her a little and buy some lemonade. She had two buckets of her own lemonade. One of them was marked, 'three pins a glass,' and the other, 'five pins a glass.' I bought a glass of each kind just to see what the difference was, but they both tasted alike to me. So I said: —

"'Say, Polly, what's the reason the lemonade in this pail is cheaper than the other?'

"'Cos, the puppy fell into that one.'

"That's about how it is with roofing-tin. When you run across a tin that's cheaper than 'Taylor Old Style,' you can bet that there's a puppy in it somewhere, or one has been in it.

"I never saw a tinmaker that did not claim everything, but when it comes to just talk, one fellow's talk sounds as good as another's.

"When I was young and new at this business I used to start in with the idea that the man who put up the best story put up the best tin. Well, I have worked away at it for a good many years, and now I have come to the conclusion that the best story goes with the worst tin. What is more, I have found out that the best tin has the most imitators, just as you always find the most sticks under the best apple tree.

"Some fellow that was wiser than I has said that imitation is sincere flattery. That may be true, but nobody wants the goods of a flatterer. Besides, if the qualities of a tin

are such that it makes other people imitate it, those same qualities ought to make you want it.

"For every sheet of tin you are putting on a house you are putting three on your reputation, and it is a mighty good thing for a tin-roofer to have a reputation that is at least three sheets of tin thick.

"That man whose roofs stand the weather longest can stand competition in his business longest.

"But I started out to tell you about the claims of some manufacturers, and about how much just talk amounts to when it aint backed up by tin.

"I once lived in a little town in the southern part of the State called Hallelujahville. It was a little town, and the people who lived there didn't, as a rule, have their clothes made especially for them, which was one reason why the three tailors in that town had very little to do. On this account they spent a good deal of their time sitting around the village store boasting about their business. One was a Frenchman, one was English, and the other was an Irishman.

"One day, in the course of an argument, the Englishman insisted that he had such a good eye that he could look a man over and make a suit that would fit him.

"The Frenchman broke in by saying that if he just caught a glimpse of a man going around a corner he could make a suit that would fit him.

"The Irishman, who hadn't had an order for a suit of clothes from anybody for two years, matched this with a statement that if he saw the corner which the man had gone around he could make a suit that would fit him.

"You will find that there are a whole lot of tin-makers who claim to make tin as good as 'Taylor Old Style,' and next to them are a whole lot of others who insist that they make tin as good as the tin that is as good as 'Taylor Old Style,' and so it goes, and the farther you get away from the real and original 'Taylor Old Style' tin, the stronger the stories you hear and the weaker the tin.

"I always have great hopes for the future of the metalworker who is building up his business-foundation on a good roofing-tin, and out of twenty years' experience I have never run across anything better than 'Taylor Old Style.'

"And the moral is: The tinner who wants to put tin in his safe should put safe tin on his roofs." — *Rufus the Roofer in "The Arrow."*

"SOMETHING FOR EACH OF US TO DO."

THERE is always "something for each of us to do."

Now, we have been "doing something" in the way of manufacturing a High Grade Heater.

We have so combined standard methods of manufacture with ideas peculiarly our own as to enable us to produce a Heater of unsurpassed excellence.

The manufacturer who produces a Heater better than The Gurney Heater will have "something to do."

The Gurney Heater is made of the best materials obtainable, materials that will stand the "wear and tear" to which the average heater is subjected.

Our Heater is perfect in efficiency. Being

simple in construction it works in a simple, direct manner, producing the required degree of heat.

The Gurney Heater is very economical. It requires less fuel than any other heater on the market. There is absolutely no waste attendant upon its use. Its use saves time, labor and money.

The Gurney Heater is exceptionally durable. It lasts longer than any other make and always gives the best of service.

GURNEY HEATER MFG. CO.,
Boston, Mass.

PERSONAL MENTION.

Mr. Geo. H. Gibson has resigned as Manager of the Advertising and Publication Department of the B. F. Sturtevant Co., of Boston, Mass., to accept an appointment with the International Steam Pump Co., having offices at 114–118 Liberty Street, New York City. Mr. Gibson was formerly connected with the Westinghouse Companies' Publishing Department, of Pittsburgh, Pa., and was for two years a member of the editorial staff of the *Engineering News* of New York City.

NOTES.

The Escalator at the Twenty-third Street station of the Sixth Avenue Elevated Railroad which has been shut down recently has now resumed regular operation. Some time ago the motor driving the Escalator was connected to take current from the third rail. It was found, however, that the voltage fluctuates over a considerably wider range than had been anticipated and the shut-down was necessary in order that alterations might be made in the motor to secure better speed regulation. During the interval that the electrical changes were in progress, the receipts of the station showed a marked falling off.

The Parks & Jeeves Blue Print Co., of 34 Merchants Row, Boston, although neither the oldest nor largest firm in the business, are surely among the leaders in enterprise as their business methods and many improvements in apparatus clearly illustrate.

Within the past year they have perfected an electric printing-machine which is so economical that they are able to make electric prints at the same cost to consumers as solar prints.

Recently they have issued tickets to their customers from which the number of square feet in an order is punched. The ticket registers 100 square feet and when that amount of work has been completed new tickets may be purchased. By the use of this ticket the price of work is reduced twenty per cent from the current prices.

No. 43. *No. 43.*

"Topical Architecture"

PUBLISHED JULY 15,

is devoted to

"Gates and Railings"—VIII.

Classified Index Continued.

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[For Classified List see Cover 3.]

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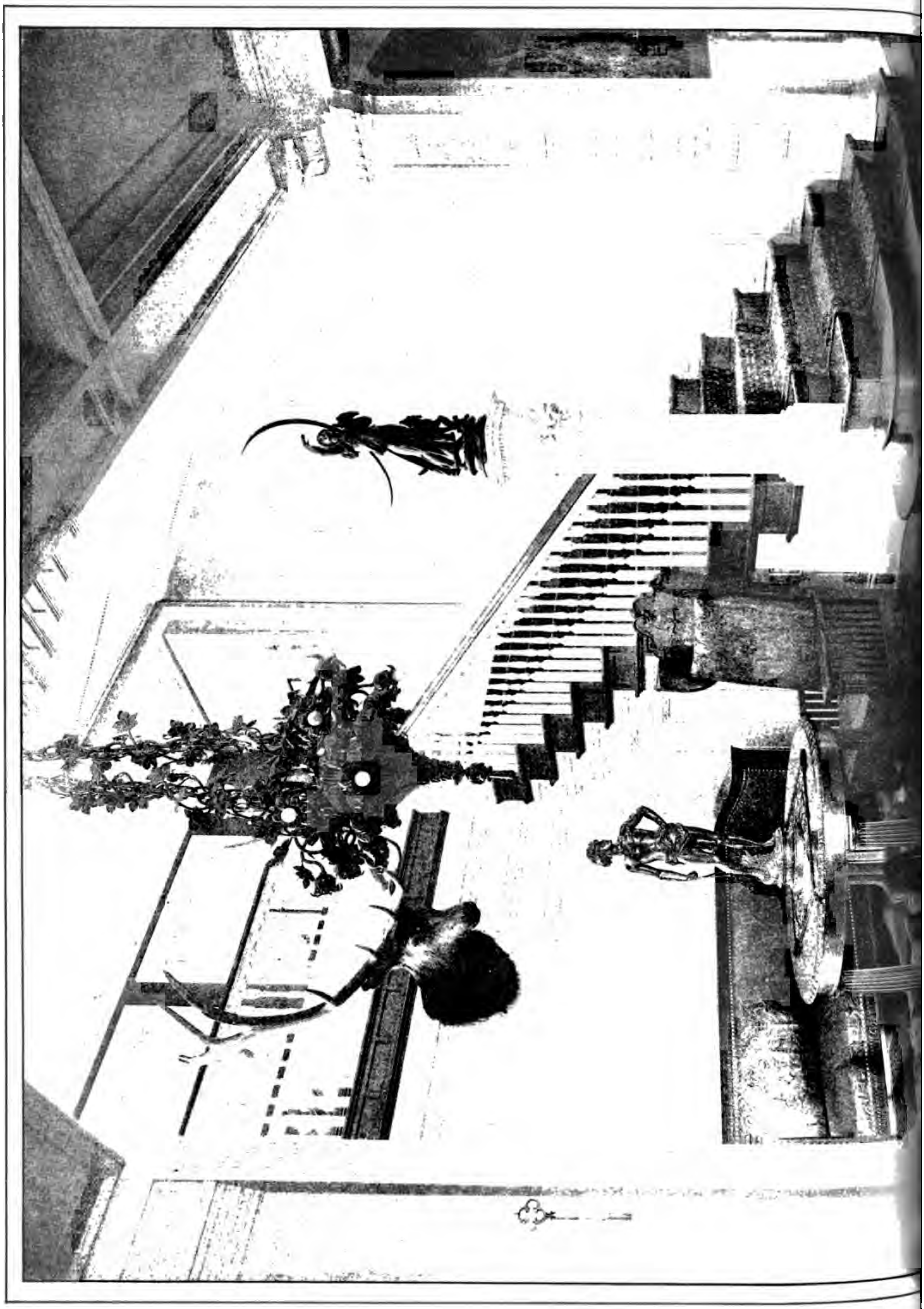
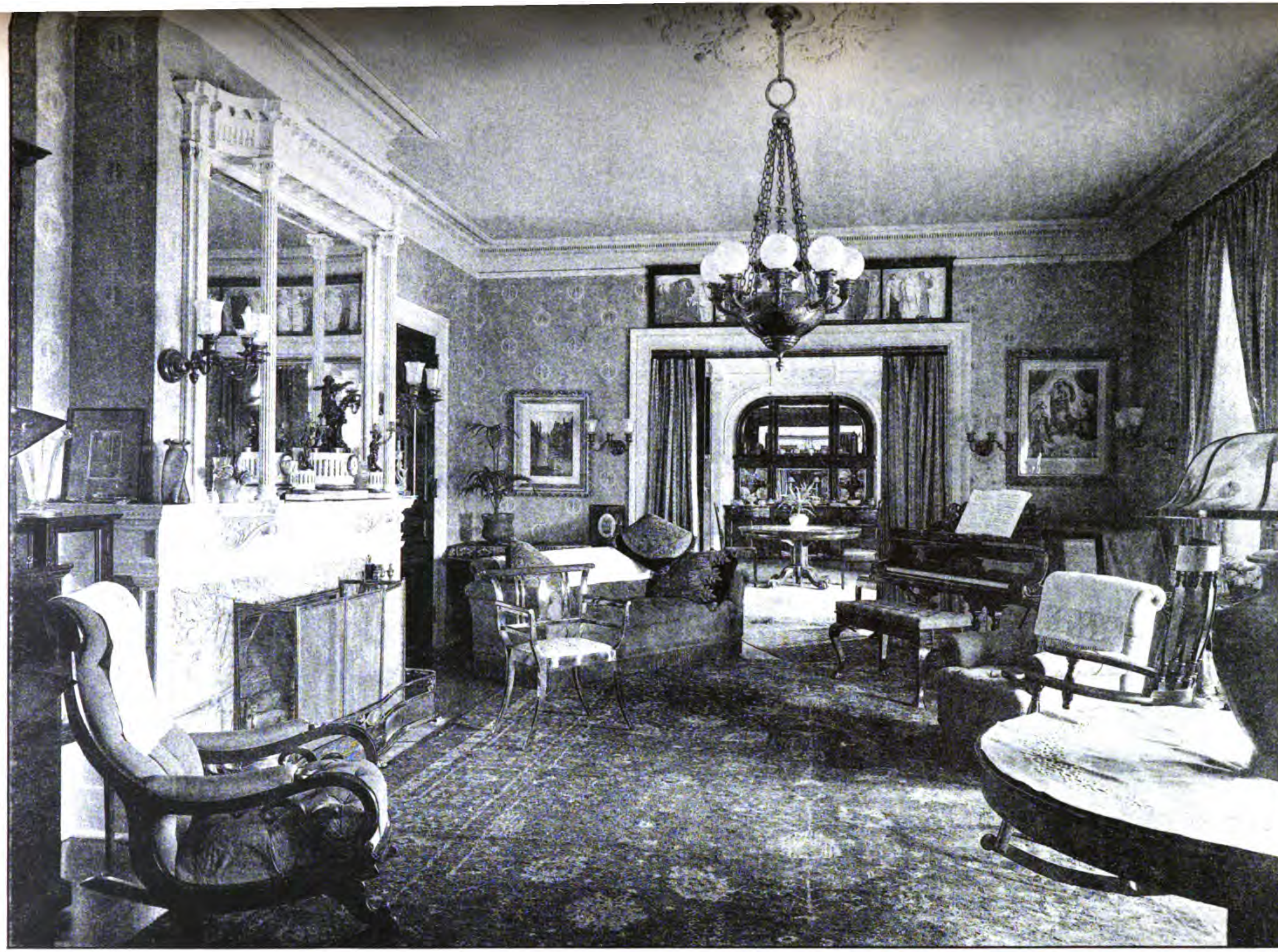




HELIOTYPE CO., BOSTON.

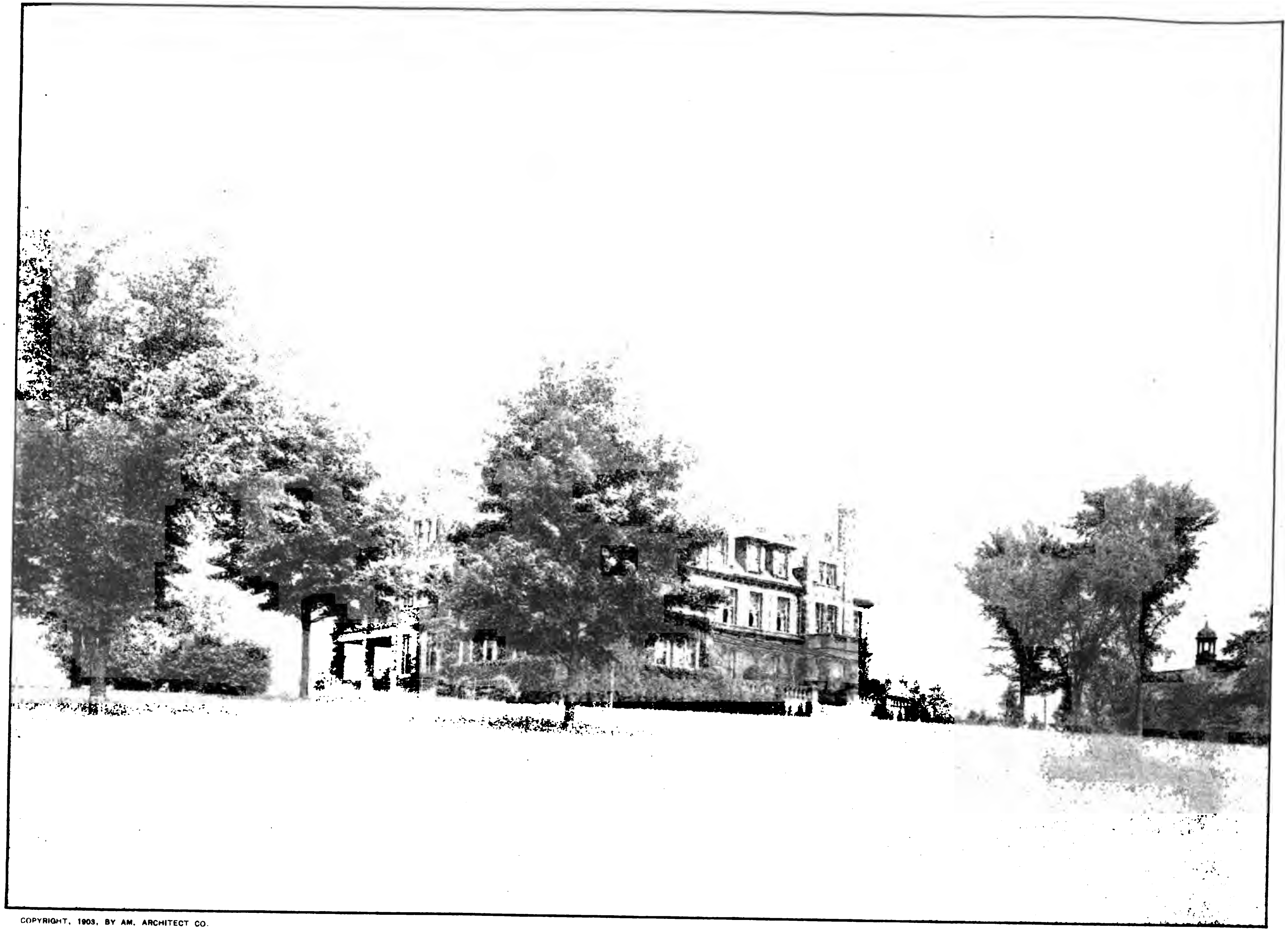
DRAWING-ROOM AND STAIRCASE: HOUSE OF A. W. MEYER ESQ., KANSAS CITY, MO.

VAN BRUNT & HOWE, ARCHITECTS.

The American Architect
Aug. 8, 1903.
No. 1441.

THE LIBRARY: HOUSE OF A. W. MEYER ESQ., KANSAS CITY, MO.

The American Architect
Aug. [illegible]



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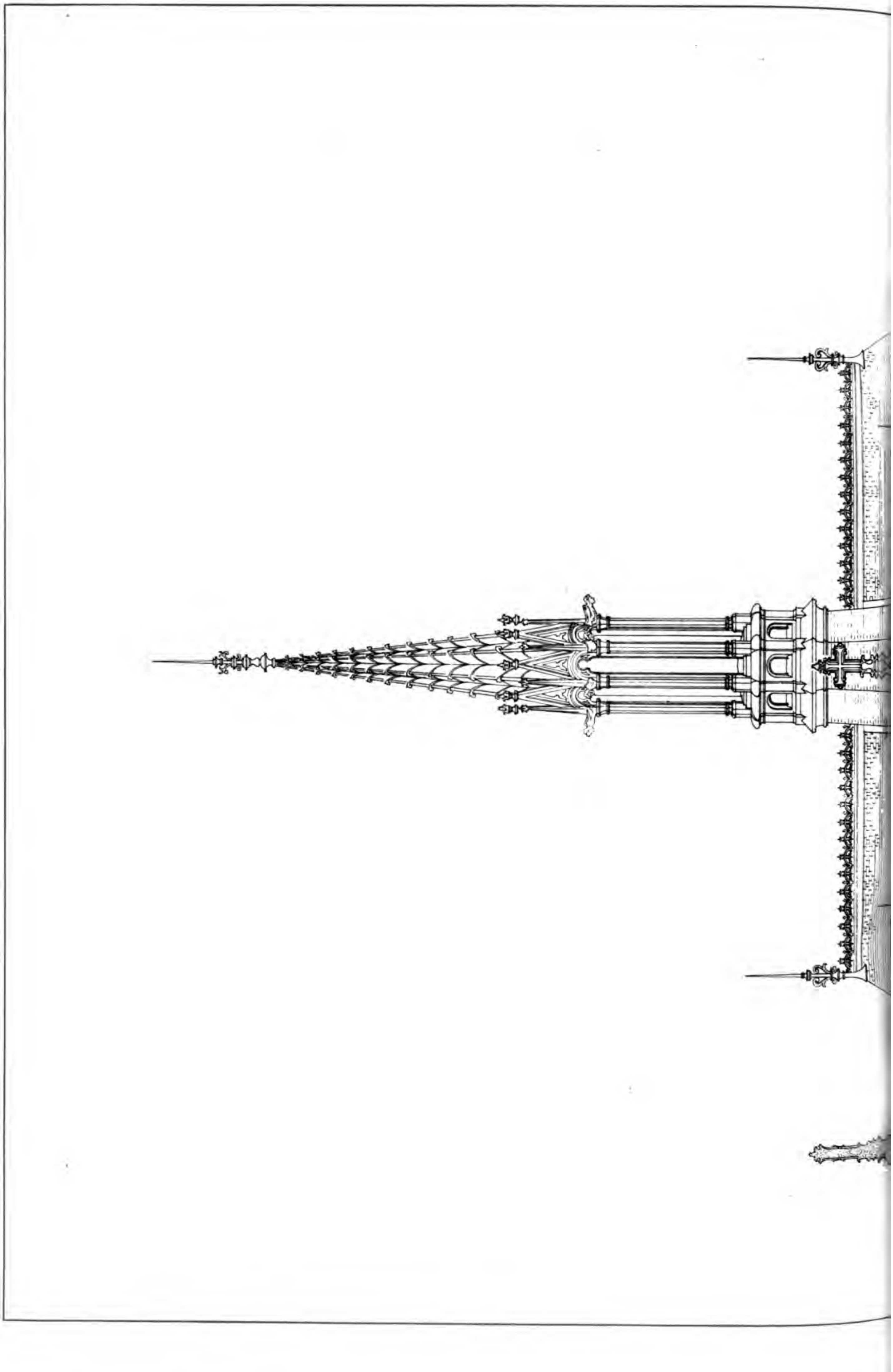

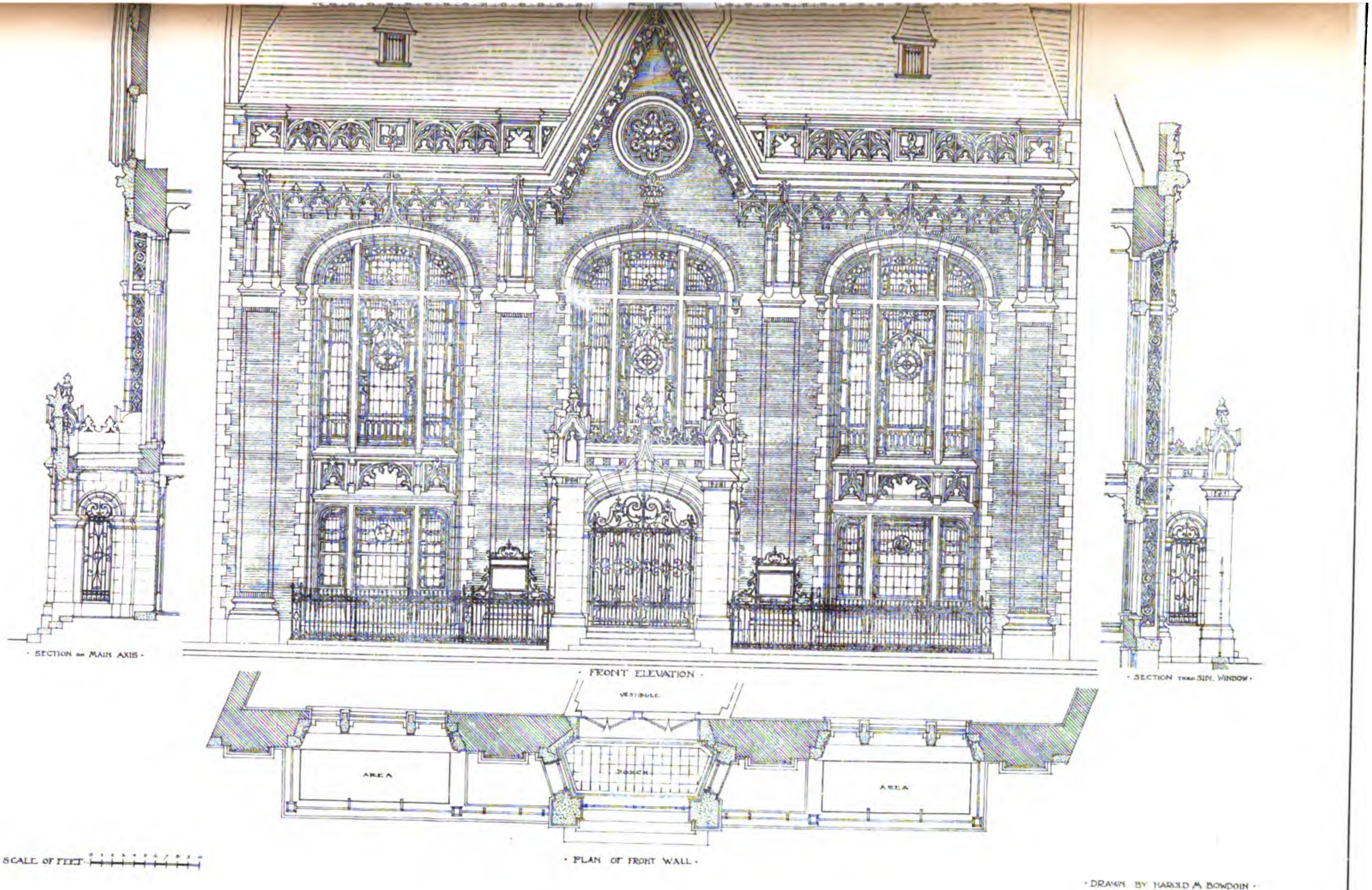

MANHATTAN CONGREGATIONAL CHURCH, NEW YORK, N. Y.

C. W. & A. A. STOUGHTON, ARCHITECTS.

HELIOTYPE CO., BOSTON.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI SATURDAY, AUGUST 8, 1903 No. 1441

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NEW YORK building matters have again a gloomy appearance. Mr. Parks seems to have everything his own way among the housesmiths and bridgemen. His propositions are "carried with whoops," and strikes of iron-workers are of constant occurrence. The steam-pipers, also, have struck, delaying several large buildings; and the walking-delegates are said to threaten to stop building operations for six months longer. It is needless to point out that the families of many workingmen will be in distress before that time expires. That the employers will recede from their position is unlikely. They have been so near victory, and they are, either secretly or openly, supported by such an immense majority of the building mechanics of the city, that it would be foolish of them to retreat; while their exposure of the methods of the walking delegates means war to the knife on the part of the latter, and no durable peace is probable until one party or the other is utterly routed. Meanwhile, the air is full of rumors that the price of labor is likely to fall. Building operations have become so restricted, on account of the general feeling that wages were forced up to a point not warranted by the demand, that there are likely to be many men unemployed for the remainder of the season, and they would be foolish not to make concessions to keep themselves at work.

UNION matters in New York are becoming interesting in certain ways. The former treasurer of the Brooklyn Stonecutters' Union has been lodged in jail, on a charge of embezzling about twenty-seven thousand dollars, which had been extorted from builders, in the shape of fines, or as payments for averting strikes, and which, as the union men think, belonged in the union treasury. The money has been traced to him, and it appears from the books of the bank in which it was deposited that he drew it out on his personal check, leaving a balance to the credit of the union of forty dollars. He immediately started for Europe, where, as he says, he "had a good time," and, on his return, was arrested, on complaint of the union officials. The defence in this case is not less remarkable than the accusation. It is not denied that the defendant met with some other union magnates in a saloon, and, after consultation, went to contractors and builders, and demanded money from them, under threats of a strike, and that the demand was complied with; and the defendant's counsel hints that the proceeds were divided among the ingenious magnates; but, on behalf of the defendant, it is claimed that these various sums never belonged to the union, or were intended for its treasury, but were the private perquisite of the treasurer and his ingenious associates. If the twenty-seven thousand dollars never belonged to the union, it is obvious that the union cannot charge its treasurer with stealing them; and, although, perhaps, strait-laced and squeamish persons might see something objectionable in the way in which they came into Mr. Murphy's pocket, the union, at least, has, according to the view of Mr. Murphy's counsel, nothing to complain of. The defendant's counsel had, apparently, an impression that the jury would look more favorably upon his client if it knew that such transactions were quite usual in labor circles; for he is reported to have indicated, by his questions to talesmen, his personal knowledge of the fact that more than two hundred thousand dollars had been paid within the past year by builders and contractors to union officials under the name of "fines," "assessments," and "expenses." It is said that some of the union men, on the return and capture of their treasurer, went to see him in jail. He told them, with charming frankness, about his trip to Europe, and said that he had five thousand dollars left which he would give them if they would have him set at liberty. They replied that this was not in their power, and he said that he would then use the money "to hire counsel to fight them as long as he could." How long five thousand dollars will enable Mr. Murphy to postpone his fate remains to be seen.

THE legality of the various State laws for the registration and licensing of architects is, we are inclined to think, open to a doubt, so far as architects out of the State are concerned, which it would be interesting to have settled by the courts. There is no question that the police power of a State extends far enough to cover licensing its own citizens to practice architecture, medicine, or any other difficult art in which the health of the community might be endangered by malpractice, but no State can exercise such police power over citizens of another State, and, if a person in one State chooses to employ an architect of another State to make plans for his house, it is doubtful whether, under the Constitution of the United States, the architect can be compelled to pay a fee, and take out a license, before he can do the work required of him. It is well known that some architects openly advocate laws licensing architects as a protective measure against competition from architects of other States. So far as such laws are protective, either in intention or practice, they are plainly in conflict with the Constitution of the United States, which expressly forbids any restriction whatever on freedom of trade between the States. How far the employment of architects comes under the definition of trade is a question which courts, so far as we know, have not yet considered; but it would be for the public advantage to have this provision of the Constitution defined in greater detail, and a stop, perhaps, put in this way to the practice, now rapidly increasing in the States, of laying burdens on non-residents which, even if legal, are felt as oppressive, and may form precedents for exactions which will lead, later, to civil war.

THE newspapers of the city of Manchester, New Hampshire, are agitated over the apparent forgetfulness of certain citizens and corporations of the existence of an official inspector of buildings for that municipality, who is authorized, according to the city ordinance, "to examine the condition of all buildings undergoing alterations or being erected within the city limits, and to serve notice in writing upon the builders, owners or architects of such structures as he deems to be unsafe or insecure, by reason of the mode or manner of construction, or the material used in the construction thereof; and shall order such changes in the mode or manner of construction thereof, and the materials used, as he shall deem necessary for the public safety."

THERE is a theory among lawyers that all forms of public control of building operations are illegal and unconstitutional; and that every man is entitled to erect upon his own land whatever sort of building he chooses, so that it does not unreasonably shade his neighbors' windows, or the public streets, or annoy his neighbors or the public in any other way, and that he holds himself responsible, civilly and criminally, for any injury caused to life, limb or property through defects in its materials or construction; and, as is well known, some of the best architects think that building laws and building inspectors promote bad building, by relieving owners and contractors of the direct responsibility placed on them by the common law, and throwing it upon the inspector, or rather, throwing it away altogether, for an inspector cannot

be held to any responsibility for his official acts. Whether these views are well founded we will not attempt to say; but there is no doubt that, if inspection is to be of any value, it must be thoroughly competent and perfectly honest. We have, of course, no reflections to make upon the official inspector for Manchester, but architects will agree that in small cities generally a combination of these qualities in the inspection of buildings is extremely rare. Even in what the Germans call the "million-cities" liberal salaries seldom attract competent men, and in smaller towns, in which salaried offices of this kind are almost always divided around among the members of a little ring, without control from Citizens' Associations or any other instrument of public opinion, incompetency and corruption flourish. We will give the inspectors of buildings the credit of being, as a rule, far more honest than many other town officials, but they rarely know anything of building beyond the rudiments of local practice, even if their qualifications extend as far as that; and yet the Manchester ordinance, like that of many other places, gives them absolute power to enter upon any structure in process of construction or alteration, and to stop any work, and reject any material, that they choose, and to order any other material used, and any kind of work done, that they alone may "deem necessary for public safety." It is hardly conceivable that, in these days of almost universal corruption, such powers should not be abused; and architects know that they are abused to promote the interests of favorite contractors, and injure those of their rivals, or to force the use of certain materials, at the same time that the art of building is little, if at all, benefited, some of the grossest architectural malpractice taking place under official approval. It is very possible that the official inspection of buildings may be made useful to the community, but only careful, competent and honest inspection is of any value, and even this should be guarded by ample restrictions, and by the power of appeal; while the putting of absolute and arbitrary power into the hands of officials whose competence or honesty are questionable simply puts a premium upon oppression and extortion.

THE Commission just created by the Massachusetts Legislature to study the question of the extension of the powers of municipalities to take land by eminent domain has an interesting task before it. Under the present laws, a city which desires to widen an existing street, or lay out a new one, can take only just so much land as is requisite for the street itself, leaving the abuttors, whose lots may be cut away so as to spoil their value, to make the best of the situation. This rule has its inconveniences, both for the abuttors and the municipalities, and it is proposed to give municipalities authority to take, under competent advice, land outside of actual street-lines, which, when the street is laid out, can be disposed of to advantage in connection with other lots, or may be sold under restrictions which will improve its value, and enhance the beauty of the street itself. As an illustration of the advantage to the public of a more extended authority of this kind, the Rue de Rivoli, in Paris, will occur to many of our readers. This was once a narrow, unattractive passageway, bordering the north side of the palaces of the Louvre and the Tuileries, and the garden of the latter. With characteristic comprehension of the requirements of the case the Parisian municipal administration, about a hundred years ago, took advantage of the authority granted by the French law, and seized all the estates abutting on the north side of the passageway. Enough was then cut off from the front of the estates to widen the passageway into a spacious street, and the remainder of the land, now enormously enhanced in value, was sold, under restrictions limiting the levels of cornices and string-courses, the proportions of fronts, and the disposition and proportion of the arcade which extends the whole length of the street at the sidewalk level. The result of this operation was not only to produce the beautiful street which every tourist admires, but, by the enforced uniformity of the north side, to add greatly to the effect of the more broken mass of the palace opposite; and it is interesting to observe that, after the lapse of a century, notwithstanding the restrictions, which apply to new buildings as well as to old ones, the locality is as much sought after as ever.

IN the case of the newer Boston parks, a feeble control has been indirectly obtained over abutting buildings by means of a contract, permitting the owners of such buildings to use the park drives for access to them in consideration of observing certain specified restrictions; but, as an abutting owner could easily free himself from these restrictions by entering his house from a side street, or in some other way, they are, necessarily, of a very mild character in comparison with those which might be imposed in an actual sale of the lots. Taking, for example, Audubon Circle, in Boston, one of the most painful examples, even in this country, of wasted opportunity, nothing would have been easier, under such a law as is now proposed, than to reserve the land for a hundred feet in depth around the perimeter of the circle, and sell it under restrictions as to the architecture of the buildings erected upon it, similar to those which have made the Place de l'Étoile one of the most magnificent spots in Europe. It is true that the diameter of the Place de l'Étoile is about twice that of Audubon Circle, but the latter is not much smaller than the Rond-Point of the Champs-Elysées, and might easily have been made even more charming. To architects, who mourn sincerely the abortive attempts at something like civic architecture which they continually meet with in this country, the proposed Massachusetts law seems to offer a possibility of better things for the future; and the profession can, we imagine, be depended upon for intelligent and earnest support of the movement.

THE project for a system of underground freight lines in Chicago seems likely to be carried out, under rather curious circumstances. A few days ago, the grant to the Illinois Telephone and Telegraph Company, which permits it to maintain a system of wires in the city until the year 1939, was enlarged, by vote of the City Council, so as to authorize it to build and maintain, during the same period, an underground system of freight lines in any of the streets and alleys of the city, and to carry its wires through any tunnel so built, the condition being added that fifty miles of tunnel should be constructed, and in operation, within ten years. The passage of the ordinance seems to have been rather a surprise to the citizens, but it is doubtful whether an excellent project could have been put more judiciously in the way of being carried into execution. The telephone company is understood to have plenty of money behind it, and has a serious interest in providing a safe and convenient means of carrying its wires about the city, so that whatever is done is likely to be well and thoroughly done; and, for its own sake, it would make the freight service as satisfactory as possible to its subscribers.

IT may be observed that the difficulties attending a great extension of business, to which Mr. Carnegie, with his usual good sense, has often called attention, are not without parallel, even in the modest field of architects' offices. We have heard of an office, in which half a hundred men, or more, were constantly employed, where it was quite customary for the draughtsmen, who received double pay for night work, to sleep, or otherwise amuse themselves, during the day, in order that they might be obliged to finish their drawings at night. It is obvious, therefore, that, as these worthy youths got paid for doing nothing in the daytime, and then got paid double for doing at night what they ought to have done during the day, what work they did, cost the architect who employed them three times as much as it would have cost an architect with honest draughtsmen, and took twice as long to do. As draughtsmen's wages form much the largest item of expense in most offices, the effect of service of this sort upon the annual balance is very material, and the complaint of some of the busiest American architects, that the balance of profit at the end of their business year is very meagre, is probably justified. It will be said that such unfaithfulness on the part of draughtsmen is impossible and inconceivable; but young men are thoughtless, and easily persuaded by self-interest, besides being often really sleepy in the daytime, so that bad example, and lack of efficient supervision, may produce results of which the men themselves are hardly conscious. Moreover, the modern American practice, made necessary by the variations in business, and the hurry with which work is done, of employing draughtsmen for a month or so, and discharging them as soon as the immediate occasion is past, tends strongly to make them indifferent to the interests of the office, and to look out for their own, even at the cost of some reproaches of conscience for disloyalty to an employer who, after all, has, probably, no personal interest in them, and whom they may never see again after their short engagement is over.

THE PREVENTION OF LOSS BY FIRE IN THE UNITED STATES OF AMERICA.[1]

THE problem presented to the underwriters of the United States and to the community as a whole is totally different from any problem that could be found in any European country, especially in Great Britain.

First, the climate or climates of the United States vary from those of Europe in matters that have an important bearing upon the construction of buildings. In this essay I will omit the conditions of the extreme South and of the extreme North, dealing with the great section which extends from the Atlantic to the Pacific, between parallels of latitude 35° to 40° N. In this section will be found the larger part of the population, the greater number of factories and workshops, the principal cities and public buildings, and by far the greater number of the public-school buildings in which the sessions of the common free schools are held.

Within this section there are very great variations between summer and winter, the common range of the thermometer being from 30° below zero Fahr. — (34° Cent.) — sometimes lower — to 90° Fahr. + (32° Cent.), and sometimes higher. There is also a great variation in the constant of humidity. On the whole, the entire section may be considered dry as compared to the average of Great Britain until we reach the extreme western coast, where the climate of Oregon and Washington more nearly resembles the humid climate of Great Britain.

The next variation from European conditions is to be found in the huge abundance of timber, both resinous and hard wood, and the relative scarcity of good building-stone in the earlier period of the history of the country. As yet no building-stone has been discovered corresponding to the stone which is so much used in France and Belgium, which can be cut and carved like cheese, but hardens like iron on exposure to the atmosphere for a short period. It therefore happened that the best material for the construction of dwelling-houses in the early stages of the growth of towns and cities and throughout the country districts was wood, disposed in a suitable manner and properly finished within and without, rather than brick or stone. It is also true that when these latter materials are used in the ordinary way, that is, without excess of cost in building thick walls with air spaces in the walls to prevent ill effects of cold, heat and dampness, they are alternately affected by heat, cold and dampness in excess, from which properly constructed wooden buildings are free. In the extreme cold of winter brick and stone walls become chilled, presently gathering humidity from the atmosphere within the dwelling or building, making the house very damp and difficult to heat; whereas, in the hot summer, brick walls heat very rapidly and become intolerable unless expensively constructed with air-spaces. On the other hand, wood is well known to be among the best of the non-heat-conducting mediums, and when disposed in thick sections of heavy mass the building of wood or timber, with properly constructed roof, is warmer in winter, cooler in summer, more easily heated and ventilated, and in every way a more sanitary building than any other kind yet devised except at very heavy relative cost.

The typical dwelling of the early settlers was therefore the log cabin, the most comfortable and suitable dwelling that could have been devised or constructed at any moderate cost within the means of the early settlers. The next typical dwelling-house, built by the richer citizens when the various Colonies began to prosper, was constructed in what is now known as the Colonial style by well-trained mechanics who brought their conceptions from England. In the early period these dwellings were constructed of oak timbers, heavily framed, covered-in with very thick boards, nailed on with wrought-iron nails; often filled-in between the wood and the inner plastering with brick and then finished in a very solid manner, often, in principal rooms, with panels in the old English style. These broad, well-proportioned Colonial houses left nothing to be desired in comfort, convenience and safety at the standard of that period and under those conditions. Many still exist, some of them over 200 years old. One part of one of them in my own town is about 250 years old. After passing through a great variety of stages of very bad design, the best architects of the country are now bringing their clients back to this old Colonial type. It is restful to witness the increasing number of these dwellings scattered around amid the crazy roofs and bad imitations of European styles with which so many of our towns and cities are infested.

This solid method of construction, both of town and country buildings, however, gave place to a very dangerous type of building from the underwriter's point-of-view, when the circular saw was applied to cutting up the solid timbers into plank, joist and scantling of various kinds, which have been put together in what has sometimes been called basket-framing, leading to the construction of buildings of a cellular type; the light frames being put together in such a way as to be very firm and strong by bracing and boarding on the outside, or covered-in by brick walls in cities; the plastering within on wooden lath and placed on the face of the inside of the frame; partitions constructed in the same way and floors of the same kind, so that the result is a building pervaded with cells of wood very difficult to cut off from each other, communicating with a hollow ceiled roof of the same type of construction, so that the largest possible loss by fire is assured from the least possible cause.

The change which has been brought about in factory construction, under the influence of the Factory Mutual Underwriters, has not been in giving up the use of wood or in any effort to construct fireproof mills or workshops, but in reverting, one may say, to the heavy timber construction of the Colonial period and the disposal of plank and timber within brick or stone walls in such a way that there may be no concealed spaces through which fire may pass out of reach of water. In that way and by evolving suitable safeguards and means of protection, the whole system of constructing the textile factories, paper-mills and workshops has been rendered safe and suitable. The losses by fire within the risks which are under the supervision of the Factory Mutual Underwriters have been, in the older companies, for fifty years less than fifteen cents per year on each hundred dollars (.0015 *per centum*) of insured property; and during a period of more than seven years the losses within these risks have been less than four cents per year on each hundred dollars (.0004 *per centum*) of insured property, or about one-fifteenth part of the loss on insured property outside their range. Their influence is now pervading sections of the country which it has only lately reached, and a profound change is coming over what may be called industrial architecture, since the prevention of loss by fire in factories and workshops of slow-burning construction has been made an applied science, of which the rules and practices are easily mastered.

Having drawn attention to the different conditions which govern architecture and building in the United States, as compared with European states, we may now take up other conditions. It would have been a misfortune had the people of this country adopted more durable methods by constructing city buildings, factories and workshops of a more permanent kind than they did construct; such buildings would have been of course at a much heavier cost, they would have become an encumbrance upon the land, and yet of such solid construction that they might have been incapable of being converted to the right use of modern mechanism. It is only about thirty years ago that a most skilful and competent mill-engineer, under whose supervision some of the largest textile factories had been constructed, made the remark that it was not judicious to plan any factory building for a duration of more than twenty-five years except as to the foundations. Had he made that remark a few years later he would not have excepted the foundations. The textile factory and many other industrial buildings constructed fifty years ago were not over 50 feet, often less, in width, and some of them were eight or nine stories high. The next type was a factory or workshop 60 feet in width, five to six stories high. Neither type of building is fit for modern conditions, and no person could run modern machinery with any profit whatever in the old type of narrow and high factory building. The modern textile factory is seldom more than three stories in height for carding and spinning; one story for weaving. Wherever there is room machine-shops are built of one story, and many other industrial buildings are now being constructed in a similar way.

The diffusion of light by ribbed or prismatic glass assures an even daylight over very wide areas, with freedom from glare near the windows.

The rules and methods of slow-burning or mill construction and for the diffusion of light are now being established throughout the United States beyond the area of the influence of the Factory Mutual Fire Insurance Companies, by the distribution of documents from the Insurance Engineering Experiment Station now beginning its work under the direction of the writer.

We may now take up the growth and construction of towns and cities. In that, again, a rapid construction of wooden buildings for temporary use has been and still is necessary for the housing of the population. Throughout the middle and the far West, where public lands have been disposed of in quarter-sections of 160 acres each, towns have been planned on rather a grand scale with a view to future growth into cities. In very many cases that growth has been attained within a very short number of years. The first buildings, hastily constructed of wood, soon give place to a better class, and if the town grows, a wider area may be covered with wooden buildings detached from but very close to each other, the only conspicuous building of a durable kind being the public common school-house, for the construction of which reservations have been made from the public land. Presently the detached wooden buildings give place to brick blocks of a more permanent character, and yet not suitable for any very long duration. In the older cities of the East, narrow streets may be bordered by alternating very old wooden buildings and modern structures, safe or unsafe as the case may be.

Hence comes the necessity for very completely organized and efficient fire-departments, and yet occasional conflagrations occur; witness the great fires in Chicago and Boston. These conflagrations were not unmitigated evils. They were disastrous to individuals and to part of the insurance companies, but they cleared away a great ruck of unsafe and unsuitable buildings, made the way for readjusting lines of streets; and both in the end worked improvement in the cities at the cost of the individuals who suffered. The Boston fire, however, did not discriminate wisely. It approached quite a large section of old and dilapidated buildings, occupying land leased nearly 100 years ago upon a ground rent — this lease is so near its termination that it is for the interest of the owners not to

[1] A paper by Edward Atkinson, LL.D., Ph.D., President of the Boston Manufacturers' Mutual Fire Insurance Co., Boston, Mass., U. S. A., prepared for the International Fire Prevention Congress, held in London, Eng., July 7-10, 1903.

remove these old buildings, but to get all they can out of them, so that they remain a blot and menace in the centre of the best business district. Had the Boston fire exerted sufficient discrimination to cross a street and to wipe out that section on the leased land, it would have been of yet greater benefit to the city of Boston. These long ground rents are very uncommon. They are now prohibited in many States, and where they exist are obstructive to the public welfare.

It thus happens, that what may be called unsafe methods of construction have been both necessary and expedient in the progress of the development of the country, and that more permanent buildings which would have absorbed a much greater part of the small capital available would have been an encumbrance rather than a benefit. The methods of construction of the country have, therefore, adapted themselves to the materials, to variations in climate and to conditions of growth. True types of architecture, like the old Colonial dwelling, have occasionally been evolved, while very many bad types have been practised in the effort to import architectural designs and methods from European schools, and to work them into buildings for which they were unfit.

Again, American architecture in cities is now being diverted from true lines of development and of art by the construction of self-supporting steel-framed buildings of many stories in height, commonly called skyscrapers, to which a few words will be given later.

Such being the quality and the conditions of the general average of industrial buildings, shops, warehouses, etc., constituting ninety-five per cent of the insurable value of property in the United States, outside the lines of the Factory Mutual Companies, what are the conditions to which the prevention of loss by fire can be applied? They are either the incapacity of architects and builders to apply conditions of safety to the construction of ordinary buildings, or the yet greater incapacity and unwillingness of owners to change from the bad methods even at the instance of an intelligent architect. Faults are committed and re-committed by owners, which might be remedied without increase of cost and very often at less cost, if it had not become the habit of owners and occupants to consider their duty ended when they had negotiated a policy of insurance covering whatever risk, often avoidable at a lessened cost, they might chance to commit. The next element of danger is the gross and criminal carelessness of the occupants of such insured premises.

The ash-heap of the United States averages one hundred and fifty million dollars ($150,000,000 = £30,000,000 sterling) a year, two-thirds of which is due in about even proportions to the inattention, incapacity or negligence of owners, occupants, builders and architects alike.

Or, to put the case in another way, the ash-heap, averaging one hundred and fifty million dollars ($150,000,000) a year, which might easily be reduced by one-half; excess of premiums and heavy cost of insurance, amounting to at least eighty million dollars ($80,000,000 = £16,000,000 sterling) a year; the excess of water-supply and cost of fire-departments, which may be estimated at twenty to fifty million ($20,000,000 to $50,000,000 = £4,000,000 to £10,000,000 sterling) more, makes the aggregate remediable excess of cost of fires in the United States at least two hundred million dollars ($200,000,000 = £40,000,000 sterling) a year, all of which may be saved. This may be attributed mainly to the restless energy and severe work given to attaining the main point of large production from resources as yet only beginning to be worked upon, and their distribution, to the neglect of the lesser elements and close economy in the small details, and to the total lack of any conception on the part of the owners and occupants of buildings, that they themselves are the only persons who can prevent loss by fire, by attention to construction and suitable safeguards; fire-departments being only capable of dealing with the fires when they occur, and underwriters being only capable of showing the way and giving advice by which the heaviest losses may be saved.

The safeguards which are now being introduced, notably the automatic sprinkling-system, might, in the judgment of the writer, abate more than one-half of this annual loss. The larger part of the losses are in the large workshops, factories, warehouses, and shops for the distribution of goods. They occur in a relatively small number of fires, each of large proportion. They occur, in by far the large majority of cases, in buildings which, although not good models, are capable of being well protected by automatic sprinklers, by standpipes and hydrants at vantage-points and upon the roofs, so adjusted as to be worked by the public fire-department, and by care in occupancy.

We now come to the position of underwriters, other than the Factory Mutual Underwriters, in this matter. Twenty years ago, or thereabout, it was thought to be the function of the stock underwriter or manager of a stock insurance company to take risks as they might happen to be at a rate which it was assumed would cover the risk, leaving a margin of profit. This system worked very well down to the date of the Chicago fire, but under it no provision had been made by a large part of the insurance companies for the hazard of an extensive conflagration; hence the bankruptcy of very many insurance companies. An advance in rates was made, but as yet no system of inspection was established before the Boston fire, and that, again, rendered bankrupt nearly every insurance company in Boston and many others. Shortly after, the underwriters, having found out that betting on bad risks, even at high rates, was an unprofitable business, began in Boston a system of inspection, putting conditions upon risks, re-rating, and establishing premiums according to compliance with conditions.

This system has been extended throughout the country, elevating the profession of the underwriter and tending to the greater security of the community and promising, hereafter, greater immunity from large losses. In fact, a large reduction in the proportion of loss to property insured has been made in recent years. The losses are or may be larger in the aggregate, but the property calling for contracts of indemnity against loss by fire (now $25,000,000,000 = £5,000,000,000 sterling insured) has increased by such leaps and bounds as to make the proportion of loss to the aggregate hazard somewhat less than it was a few years since.

In this way the lines of future improvement are well marked. The different unions and combinations of the stock underwriters have established testing laboratories notably in Chicago, where they are dealing with very many problems that do not arise with the Factory Mutual Underwriters, and with some of those on which they are working in harmony with us.

On the other hand, the right methods of building factories and workshops of timber, stone and brick have been fully established, and the methods of protecting by safeguards have been brought to a final condition in the present state of the art.

The invention of the self-sustaining steel frame building, developed in the construction of what are known as skyscrapers, has brought an entirely new problem before the underwriters as well as the engineers. In the first instance it was assumed that because a building was made of incombustible material it might be considered indestructible by fire, with very slight protection to the metal from heat. The Factory Mutual Underwriters distrusted this theory and have, with rare exception, kept unprotected steel beams from being used to support plank floors, and have, in recent years, caused cast-iron posts, formerly used in the support of factories, to be disused, the preference being given to squared wooden posts.

With the increasing cost of timber and possible scarcity of large logs it became expedient for the representatives of the Mutual Underwriters to be prepared for so-called fireproof construction. To that end the Insurance Engineering Experiment Station has been established under the charge of Prof. Charles L. Norton, and under the general direction of the undersigned, for testing both by fire, by laboratory experiments, and by lapse of time all the different methods of so-called fireproof construction and all the fire-resistant and fire-retardant materials for inside finish. Up to this date they have published five reports.

The experience of the underwriters who insure the steel-framed buildings has not justified the great confidence with which the work was undertaken. Very destructive fires have occurred in buildings of this type, which have been filled with combustible contents. In some cases it has been the judgment of the appraisers that the total loss on contents of very large value has been due to the resistance of the building; whereas, in buildings of ordinary construction which fell after a fire of moderate duration, there have been large salvages on damaged goods.

Several of the methods of protecting steel from heat have failed, and while the building has stood well and has, I believe, in all instances been capable of repair, there has been much damage by heat, especially in the upper stories. It has proved that the prevention of loss by automatic sprinklers is as necessary in an incombustible building as it is in any other. A large portion of the biggest department-stores are now being equipped. Other fires in incombustible buildings, causing very little damage, have generated so much suffocating smoke as to make them hazardous and to lead toward the danger of a panic.

But beyond this question of fire-hazard is the yet more important problem of corrosion, a factor which at the beginning attracted little or no attention. It, unfortunately, happens that the type of steel used in the construction of buildings is more subject to rapid corrosion than any other type of metal derived from iron ore. Whether or not the skyscrapers will be safe for any considerable period of time, say for a generation, is now an open question. How to protect steel is being made the subject of the most exhaustive investigation, and will be one of the most important subjects dealt with by the Insurance Engineering Experiment Station.

It may happen that we passed through the age of unbaked clay to stone construction covered-in with timber roofs, then to timber, brick and stone in combination; in this country, through the age of the log house to the period of plank boards and scantling, or combustible architecture, so-called; then to the period of iron, used mainly outside, filled-in with brick for walls, iron posts and beams within; thence to the age of steel in the present type, from which we may pass on in the upward spiral again to the age of clay in its various forms of brick, concretes and cements, in that way combining stability, durability and safety from the danger of fire from within or heat from without.

If the foregoing explanations of the condition of the United States in respect to loss by fire are sustained, the general conclusions may be stated as follows: —

First. — Entails upon land and succession by primogeniture are either forbidden by law or by common practice. Estates in land as well as in personal property are customarily distributed in equal proportions among children without regard to sex. Settlements in trust are limited in all States, I believe, and might perhaps be more strictly limited with advantage. Spendthrifts and incompetents can

only be protected by trustees through about one generation; after that the tools of production, whether in land or capital, fall by distribution to those who may use them best.

Second. — Public buildings are now being or have been constructed, with more or less regard to duration, many of them for long duration. Factories, workshops, railway termini, industrial and commercial buildings are and have been built with a view to short duration, in order to give place from time to time to buildings that may be adjusted to the improved conditions of each generation or shorter period. Dwelling-houses in cities have been constructed with a view to longer duration, but with scarcely an exception the sites of dwelling-house districts have within one or two generations passed over to use for business purposes. In many cities this is now going on at a more rapid rate than ever before. Dwelling-houses of the best class, capable of useful occupation for fifty years, are being pulled down to make way for the expansion of trade and commerce. The adjustment of buildings to the purposes of each generation is almost as necessary and almost as rapid as the changes in the mechanism which is put into operation in industrial buildings. The factory or workshop which does not throw out mechanism, perhaps but half worn, in order to adopt the latest improvements, is sure to be left in the close competition on the very small margin of profit which suffices for the modern method, and of late the buildings must often be displaced as well as the machinery.

The former wasteful methods of leaving agricultural machines to rust in the fields during the winter has given place in many cases to a more intelligent method of combination among a few farmers, to buy each year's machine and wear it out in a single season, or, perhaps, in two seasons, in order to be ready to take over the better one which is sure to come in a very short time.

Workmen with very few exceptions also adjust their methods to these constant changes. The efforts of the small proportion of the workmen who belong to unions to limit the applications of inventions are futile.

In other words, the term "fixed capital" has little application even to the buildings and machinery in use in the United States. The inventor is the most destructive agent, and in this work fire may be said to coöperate to the grave loss of the individual or the community for the moment, but helping on and opening the way to further improvement. "There is nothing constant but change," and on the record of fifty years or more for which we have complete and adequate data, in spite of the destruction by fire and the absolute loss for the moment to the community — in spite of careless methods in construction, yet through the constant application of modern science and invention to all the arts of production and distribution, the working people of the United States — using that term in its limited sense, and designating only those who do the manual and mechanical work of the nation, have secured, decade by decade (subject to temporary fluctuations of little moment) a constantly increasing share or proportion of a constantly augmented product.

It may not have been wholly the purpose of your request to have me submit this paper, that I should present the general conclusions, but one who regards the loss by fire as, in one sense only, one of the factors in the development of the social conditions of the United States can hardly fail to deal with the whole subject in its broad aspect rather than on its strictly technical side.

The amount of insurance now carried by the Factory Mutual Fire Insurance Companies is in round figures twelve hundred million dollars ($1,200,000,000 = £240,000,000 sterling), of which 75 per cent, more or less, is covered by the older companies within very strict limits as to the kinds of risks insured at the highest standard of construction and protection. The younger companies are rapidly extending the work over other classes of risks, bringing them by successive measures to very full protection by automatic sprinklers and other safeguards.

The series of documents mainly issued by the Boston Manufacturers' Mutual Fire Insurance Company, of which the undersigned is President, during the last twenty-five years — of late supplemented by documents issued by the Associated Companies — have been published for the purpose of bringing construction and apparatus to a fixed standard.

First. — General plans and specifications for the mill or slow-burning construction of factories, workshops and storehouses.

Second. — The lay-out of reservoirs, pumps, pipes and hydrants in due proportion to the requirements in each case.

Third. — The lay-out of standard protection with automatic sprinklers, sizes and proportions of pipe and distribution of heads.

Fourth. — Steam fire-pumps constructed at the standard established mainly by John R. Freeman, C. E., now one of the executive officers of the Factory Mutual System.

Fifth. — Standard valves, meters and by-passes for water-supply; and standard air-valves used in connection with the automatic dry-pipe sprinkler-system, for the protection of storehouses and other buildings that cannot be heated in winter.

Sixth. — Glazing for the diffusion of light with ribbed or prismatic glass, adapted to the special conditions of each building or section of a building.

Seventh. — Standard fire-resistant doors and frames, of wood encased in tin.

Eighth. — Standard of wired-glass windows and frames, often approved where light is needed, and often accepted in preference to movable shutters.

Ninth. — Standard of the fire, flash and viscosity tests of mineral lubricating oils.

Tenth. — Standard of mineral illuminating oils and of lamps in which such oils may be used for lighting.

Eleventh. — Standard lanterns for the use of watchmen or mechanics employed in night work, both for the burning of sperm oil and kerosene oil.

Twelfth. — Standard for the lay out and safeguards for applying electric power or light.

Thirteenth. — Standard for housing hose and fire-appliances in mill yards, with specifications for the equipment of such houses.

Fourteenth. — Standard general organization for mill fire-departments.

Fifteenth. — Standard forms for the regular self-inspection of the insured mills and works, subject to variation according to the nature of the industry.

Lists are printed, changed from time to time as occasion requires, of a sufficient number of the makers of high repute of all the types of apparatus above named, and of engineers and mill contractors, in sufficient number in each department to maintain fair commercial competition, but upon whom full reliance may be placed by our members to maintain the Mutual Underwriters' standard in all the work or apparatus which they may supply. In this way assurance is given, especially in respect to steam-pumps, hose and other fire-apparatus, that there will be no attempt to impose what may be called cheap and nasty apparatus upon buyers, while buyers will be assured that the Underwriters' standard will be maintained at fair charges for the service. Our members are also relieved in great measure from the pressure of vendors of patent oils, belt-dressings, lighting and heating apparatus, new types of sham materials and the like, because the vendors know very well that before any of their nostrums are bought or even accepted for trial, samples will be sent to the laboratory of the Mutual Underwriters, where many frauds and dangers have been exposed.

A physical laboratory is maintained by the Associated Factory Mutual Companies, to which any kind of oil, hose or other material may be sent for physical tests, chemical tests being made at the Massachusetts Institute of Technology. As soon as the requisite buildings have been constructed, fire and heat tests will be made by the Insurance Engineering Department in respect to all so-called fireproof or fire-retardant materials that may be used either for the protection of wood or steel or in the construction of buildings. It may be added that the cost of making surveys, lay-outs, inspections, special and regular, including the cost of making and executing plans, of which an example is sent herewith, and for the services rendered by the Bureau of Inspections on joint account and at the joint expense of the Associated Mutual Companies, is covered by a charge of one hundred and fifty dollars ($150) on each million dollars of insurance written.

The development of an applied science for the prevention of loss by fire in cotton, woollen, paper and silk mills, cordage factories, machine-shops covering large amounts of woodwork, cotton, hemp and jute warehouses and the like, all subject to special or extra hazards, in some respects subject to almost explosive conditions, has not been based on any preconceived or *à priori* plan. The system of Mutual Insurance originated with the late Zachariah Allen, of Providence, R. I., in 1835, making slow headway down to 1850, when the Boston Manufacturers' Mutual Fire Insurance Company, of which the undersigned is the chief executive officer, was organized. From that date the conduct of the work was on what might be called a purely empirical plan; occasional inspections by men who had been trained in mill work or in the management of mills without special scientific attainments. This continued until about 1875, when it became manifest to the undersigned, then an active director, that unless new safeguards and new methods were devised to meet the increasing hazard of wider areas, greater concentration and proximity of factories, of mineral lubricants, new and dangerous chemicals in print-works and dye-works, and, presently, electricity, there might be a calamity and call for an assessment which would check and might destroy the whole mutual system, insuring in all the companies, in 1879, less than two hundred million dollars ($200,000,000 = £40,000,000 sterling). In that year the writer became President of the Boston Manufacturers' Mutual Fire Insurance Company. He began by first investigating the automatic sprinkler, and with the support of only two manufacturers who had adopted it on its merits, he pressed the adoption of the automatic-sprinkling system upon unwilling and incredulous manufacturers. It took fifteen years to bring the protection of the main mills and works nearly to a conclusion.

In 1895, the most destructive fire to which the companies had ever been subjected, originated in what is called the spontaneous combustion or slow oxidization of the wooden lagging of a ten-foot cylinder of a compound engine in a room for which sprinklers were under contract but had not been placed. Under conditions that might never occur again, the loss of over a million dollars was distributed among the Mutual Companies. In that year, however, nearly complete protection by sprinklers in all main mills and works was brought to a conclusion; since that date, 1895, the losses by fire have been less than four cents per $100 (.0004 per centum) each year, the larger part of this small loss occurring in unsprinkled storehouses, which will all be under sprinkler protection before the end of the present year.

In the interval, as other new causes of danger have arisen, skilled experts have been called into the service in every branch of physical science, except in electricity, in which department at the beginning there were no skilled experts, and the fire-hazard was an unknown quantity. A well-bred engineer was, therefore, brought into the service to study the fire-hazard of electric-lighting; rules for the instalment of electric plants were established, brought to the attention of all the makers of electrical apparatus, and made the condition on which they could put their plants into the factories insured in the mutual system. The rules have been expanded to meet new conditions and new inventions, but have never been materially changed.

The whole subject of lubrication with mineral and mixed oils was made the subject of a complete study. A standard was established, and wherever volatile oils were found in use they were condemned. The Standard Oil Company was induced to change its whole method of distillation, adjusting patent contests, and presently, within a year, putting on to the market such excellent lubricants at so low a price as to cause all the dangerous oils to disappear.

Each subject has been taken up, put under the charge of thoroughly trained engineers and experts, until at the present time the science may be called complete in its application to the special classes of property insured, and to the buildings constructed on the slow-burning principle. Of this, the writer has merely been the executive head charged with the selection of most of the experts, who are now his coadjutors, and bringing about a combination which, as has been stated, in the so-called senior and junior companies now covers risks to the amount of twelve hundred million dollars ($1,200,000,000 = £240,000,000 sterling) — a very small part, possibly five per cent, of the insured value of the property of the United States.

I may be permitted to add that in the judgment frequently expressed by many of the members of the mutual system, it has performed service in the investigation of all the subjects that have been named, and in saving wasteful expenditure on oils and other material, or in the construction of buildings, more than equal to the cost of the service, even if there had been no contract of indemnity or policy of insurance granted by the companies, and their work had been limited to the investigation and inspections of which record has herein been made. EDWARD ATKINSON.

A HOSPITAL WARD.[1]

THERE are several instances known in new wards constructed upon the latest principles of failures which have been absent from the older and entirely out-of-date buildings, and the reasons have been — in the cases with which I am personally acquainted — not far to seek. The old wards were known to be dangerously unclean, and special precautions were therefore taken to counteract this condition. The new wards were so very bright and clean that anything but perfunctory cleaning was scarcely thought necessary. In the old wards the windows were kept open, and the very walls, innocent of plaster, were porous enough to be an assistance to ventilation. In the new, it appeared that the provision of air inlets in the walls was thought to obviate the necessity of opening the windows.

Another example of this neglect of well-worn principles occurs to me, although it is not directly connected with a hospital ward. The drainage of a certain building was relaid upon modern principles with manholes at every branch and change of direction. The old drains were always well flushed periodically, and thus kept fairly clean. The new drains were supposed to act forever without such assistance. Five years after they were laid, when superintending some repairs, etc., at the building, I made a general examination of the system, and was compelled to use a crowbar to open up the covers of the manholes, which had never been touched since the drains were first laid. The building owner in this case had not realized that manholes were merely constructed for more easy access to and inspection of the new drains than was possible with the old.

One other example — and this was in connection with a ward. The whole of the inlet ventilators were expensively constructed with pipes glazed internally. On revisiting the hospital a year later I found these flues black with dirt. They were never cleaned.

Are not we who build hospitals apt at times to forget the principles upon which we design certain details? It is an accepted principle, for instance, that all angles, internal or external, should be well rounded, yet not many years ago I remember an architect drawing the attention of a class of students to the hollowed skirting between the walls and floors of his wards; then proceeding to point out an arrangement he had devised for preventing the beds being pushed against the walls. This consisted of a square fillet nailed to the floor within half an inch of the skirting — *i.e.*, he had carefully done away with one internal angle to the floor and added two!

I have heard, too, of air-inlets constructed as I have described above, and closed at one end with a fixed grating, which effectually prevented any cleaning.

After all, the great principles to be kept in view in the details of a hospital ward are few and simple, and one of them — not the least important — is the avoidance of all sharp internal angles, deep-cut mouldings, and other not easily cleaned lodgments for dust and dirt, those harbors of disease germs and a source of pollution to the air of the ward. It will be sufficient, in so short a paper as this, to deal mainly with this principle.

Floors.—It may be taken for granted that whatever difference of opinion there may be with respect to the walls, we shall all be agreed that the floor of a ward should be laid on a solid foundation, and that the surface should be as impervious as it is possible to make it. Also that it should be smooth and free from holes or crevices likely to retain dirt or dust. For this reason no one thinks nowadays of using plain jointed soft-wood floors, because in addition to being absorbent the material is bound to shrink, and thus leave any number of crevices for the secretion of dirt and dust. Floor sweepings well wetted and impregnated with soap make a horrible compound.

Modern floors are of several kinds, which vary according to the fancy of the particular architect or the managers of the building. They comprise the following, viz, hardwood block floors, hardwood tongued boards laid in narrow widths, secret nailed and polished; asphalt, terrazzo, patent composition floors such as Eubœolith, etc.

The hardwood floors are most frequently made of oak or teak. Hitherto I have myself adopted kiln-dried maple in very narrow widths. In addition to being an exceedingly hard and unwearable floor, its light color shows up dust much more easily than dark woods, and this, to my mind, is an important detail. It would seem to be very desirable that dirt should always proclaim itself, but those who are immediately responsible for the cleanliness of the floors are, it is to be feared, not always of that opinion.

The most usual finishing to wood floors is beeswax and turpentine highly polished. I believe that if this is regularly wiped over with a wet rag and as regularly polished, it is a very good surface; though no doubt it is desirable to have the surface entirely cleaned off and renewed at intervals.

Terrazzo floors are much advocated on account of their supposed impermeability. I do not think them quite so imperm-able as they are supposed to be. After all, the main part of the material is cement, and it is well known that both cement and marble chips are fairly absorbent materials. Indeed, the comparative impermeability of this floor is due to the high polish it receives when first laid, and that is very soon worn off. Perhaps these floors are best treated by being polished with beeswax as for wood floors. Even so, they are very hard to the feet, and the mottled color too easily conceals dirt.

Asphalt is, no doubt, the most impervious of floor materials, but it is of a dark, uneven and bad color, and is therefore seldom used.

My experience of patent composition floors has not hitherto been so fortunate as to enable me to commend them highly. They have some undoubted virtues, however, and the material is more impervious and less subject to the action of acids than any I know. Unless very carefully laid, they appear to be liable to swell and crack. The material can be colored, and when polished the surface is excellent.

Skirtings. — The skirting, if it can be so called, to the floors should be rounded so as to form a good hollow. The most usual radius is from 2½ inches to 3 inches. Latterly I have used 1½ inch only, which is quite sufficient for its purpose, and can be carried round projections more easily than is possible with the larger radius. All that appears to be necessary is to have such an angle as will permit of the whole surface being easily and rapidly cleaned and prevent stagnation of air. It is best formed of the same material as the floor. I have, however, seen hollowed glazed bricks used, but there are too many joints, and the edges of the bricks are not generally even.

Wall-surfaces. — There are practically two opposite principles which govern the material of which the wall-surfaces should be composed, and these are derived from views on that much-vexed subject — ventilation. It would be rather trenching upon this subject, which is large enough for separate treatment, to attempt to discuss whether the walls should be porous or not.

It is safe, however, to assert that at the present time, for hospital-ward walls, at least, impervious walls are mostly in vogue. If we adopt this principle, the next most important consideration is that the surface of the internal faces should be easily cleaned and kept clear and free from dust. In some modern treatment of walls we have, I think, somewhat overlooked this principle, although on the surface it appears to have been carefully studied. I refer to the growing practice of lining the ward walls with tiles. The use of tiles has no doubt given us a more impervious and even surface over a large area, but it is discounted by the numerous joints which no care nor skill in the fixing can make smooth, except in a limited way. The ideal surface would no doubt be an unbroken and polished surface such as obtains on tiles, affording no ledges for the lodgment of dust; but this has been fairly well achieved by the use of enamel paint upon hard trowelled cement surfaces.

It is scarcely possible to obtain a more generally smooth surface than with trowelled cement — Keene's or sirapite, for instance. These can be brought to a polished surface. It is difficult, if not impossible, however, to obtain a really even color. Although enamel paint can be used with decorative effect, pictures would still be required to decorate the walls, and the ordinary framed picture is a veritable dust trap. Therein tiled surfaces have the advantage of painted walls, as they can be decorated with permanent pictures painted on the surface. It would be, of course, too costly to renew pictures every time the ward walls required to be repainted.

It would be possible to cover permanent wall-paintings with glass let in flush with the wall-surface, and I am not sure that this has not been done.

Ceilings.—There can be no question that ceilings should be non-porous, and they are best painted.

Windows.—As to the best form of window for a hospital ward, there appears no general agreement. The most usual is the ordinary

[1] A paper read by Mr. A. Saxon Snell, F. R. I. B. A., in the Section of Engineering and Architecture at the Congress of the Sanitary Institute, Bradford, Eng.

sash window with a hopper above opening into the ward, with spandrel sides to prevent down-draught. It would appear, however, that its forms and construction involve the many angles, crevices and hidden voids which in other parts of the ward we strive so much to avoid. Casement windows with solid frames are at least not open to this objection, though no doubt their advantages in other directions may be questioned.

At Willesden Parish Infirmary I have used casement windows brought down to within 12 inches of the floor, and with hopper next the ceiling. The casements open inwards, and thus form a protection for the bed. It is possible also by opening the windows to their fullest extent to fairly flood the wards with air.

At Charing Cross Hospital, I am adopting a form somewhat similar to what I believe is known as the "Middlesex" window, owing to the alleged fact that it was first used at that hospital. There are five sashes of equal size in the height of the window, all of which (excepting the lowest) are hung on centres and controlled by one rod and lever. The sashes close one upon another, and there are therefore no transoms. The lowest sash is separately hung on the bottom rail. It is obvious that a window so constructed can be opened to a much larger extent than is possible with the ordinary sash window. I should add that all except the controlling lever or the opening apparatus is fixed on the outside of the window.

If it is possible to fix the glass of the sashes quite flush with the inner surface of the sashes, a great advance will be made.

Doors. — Nothing much can be said with respect to doors in a ward. They should be made wide enough to allow of the passage of a bed. It is desirable that the upper panels should be glazed with clear glass, and that because of a principle to which I shall refer later on.

The whole question of the material for joinery might be considered here. Hardwood throughout is generally adopted, where the question of cost is not vital — hardwood oiled or French polished. Its comparative freedom from material shrinkage and its harder or less absorbent surface are great advantages; but here again I think that enamel paint is not much, if at all, inferior.

I am hoping in time to obtain what I may call solid joinery, *i. e.*, built up without panels with the inevitable sharp internal angles which can only be kept clean at the cost of great labor. Of course, it is possible to have solid or flush panels, but shrinkage soon shows up the joints, which then become dust-traps impossible to clean.

There are some Canadian doors now made of which the principle of construction could, no doubt, be applied so as to successfully overcome this difficulty. They are made up of quite small sections of wood very closely fitted together, and sheathed with hardwood beautifully dovetailed on, and the whole is pressed and almost welded together by hydraulic pressure. At present they are made to imitate the ordinary panelled door, but one is being made for me now — as an experiment — of solid soft-wood, sheathed all round in oak.

Furniture. — It is in the furniture and fittings of wards, for which the architects are responsible, that there is a general falling away from the principles of construction we are considering; although I am bound to add that some very notable improvements have been made in late years in the construction of chairs, tables and bedside lockers. The last-mentioned especially call for consideration if only because they are less under observation and control than the furniture which stands out in the open. The tops are now usually of glass or marmorite, and if it were only possible to get rid of the closed cupboards it would not be difficult to design them generally so that every part could be readily and easily cleaned.

The mention of cupboards reminds me that these fittings are generally objectionable and should be as far as possible banished from the ward. One at least is, of course, necessary for holding surgical and medical appliances, lint, medicines, etc., but this should not, as is frequently the case, be placed or built against the wall. It should stand out in the centre of the ward, and should be constructed of hardwood, framed and glazed all round and on top and fitted with glass shelves. I am not certain that such a fitting commends itself to all nurses. Sometime since a nurse complained to me that it cost her much labor and trouble to put away anything in these fittings, because, in effect, anything in the nature of disorder, or want of absolute cleanliness, could not be concealed even from her own sense of order — not to speak of the doctor on his rounds. I am sure that you will agree with me that therein lies its great virtue.

Fixed or heavy tables and chairs are to be avoided. It is quite possible to make a light table rigid.

Stoves. — I collect every reference in the building press to hospitals, new and old, and a great number of the smaller paragraphs are, I find, inserted by makers of particular ward-stoves which have been used in the building. There is no reason to doubt that they are excellent stoves for many purposes, but as they are built of iron plates and grilles, and plentifully adorned with mouldings, etc., they would appear to be entirely unsuitable to a hospital ward.

One or other of the forms of stoves which is built up with plain firebrick and bricks or tiles is far preferable. There is a greater amount of heat given out by radiation and far less by conduction, and there are few lodgments for dust and dirt. Some of these brick and tile stoves are honeycombed with ventilating flues for heating air, which is conveyed by long horizontal flues from the outside. They would not appear to be open to objection, as they are so constructed as to be easily kept clean.

Heating and Ventilation. — It is not the purpose of this paper to deal with such large and controversial subjects as heating and ventilation, or to enter into any discussion upon the relative merits of natural or mechanical ventilation.

It is only necessary to remind you that whatever pipes or fittings are used, they should be so placed and constructed as to be easily kept clean. If possible, too, all controlling valves and pipes are to be kept out of the ward.

Flues of any sort, whether in the floors or walls, should also be so constructed, with movable gratings and covers, so as to allow of easy access for cleaning and disinfection.

Lavatory Basins. — Until quite recently a fixed lavatory basin was, I think, regarded as quite inadmissable in the ward itself, but the inconvenience of hand basins and the great improvement in the construction of fixed lavatories have combined to overcome the objection to their being in the ward. Of course, they are only for the use of the medical staff and the surgeons. The first hospital in which I saw them was one which is not even yet finished, and which has claims to being considered of the most modern design and construction. The basin was, however, of quite an ordinary pattern, and fixed close against the wall, but I regret to add that, underneath, the supply, waste, overflow and anti siphon pipes — all on the surface of the wall — reminded one of Medusa's head.

While dealing with these fittings I should like to refer to the deceptive character of so many sinks and basins in the market, which are designed especially for hospital purposes. They are beautifully designed to avoid anything in the nature of dirt crevices or mouldings on the surface, and so far only as they can be obvious to the casual observer. But the glazed surface and rounded angles are confined to the top and sides. Underneath they are rough, angular, and full of pockets which are never likely to be cleaned from the day they are fixed. Much improvement is being effected by a few manufacturers to meet the persistent demands of those who value cleanness and virtue in the unseen parts as in those seen.

One other detail I have to refer to, and that is the necessity of what I may call "openness" in every part of a ward and its adjuncts. It would seem desirable that in a general way both patients and nurses should always be under observation, or at least liable to be observed at nearly all times by the superior officers. If that appears to be objectionably stringent, I may add that it is not at all necessarily so.

I need scarcely say that I exclude the bath-rooms and ward conveniences, but certainly the duty-room and ward kitchen and separate day-rooms should always be more or less open. My own practice is to make the side next the corridor leading to the ward of glazed partitioning.

When patients know that they cannot escape even casual observation, they are more likely to behave themselves correctly, and the nurses themselves do their duty none the worse for the lack of opportunities of concealment.

It is better, too, that nurses should always be employed when on duty for shorter hours, than that the weariness of long hours should lead them to lounge or neglect their duties when occasion offers.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

HOUSE OF A. W. MEYER, ESQ., KANSAS CITY, MO. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, KANSAS CITY, MO.

LIBRARY IN SAME HOUSE.

DRAWING-ROOM AND STAIRCASE IN SAME HOUSE.

MANHATTAN CONGREGATIONAL CHURCH, NEW YORK, N. Y. MESSRS. C. W. & A. A. STOUGHTON, ARCHITECTS, NEW YORK, N. Y.

Additional Illustrations in the International Edition.

ENTRANCE-FRONT: HOUSE OF A. W. MEYER, ESQ., KANSAS CITY, MO. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, KANSAS CITY, MO.

DINING-ROOM IN SAME HOUSE.

MONUMENT TO CHARLES GARNIER, PARIS, FRANCE. M. J. PASCAL, ARCHITECT; MM. THOMAS, GERMAIN AND CARPEAUX, SCULPTORS.

This plate is copied from *La Construction Moderne.*

CHÂTEAU DE LA CORDELIÈRE. M. SANGER, ARCHITECT.

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BREWERY BUILDING, MUNICH, BAVARIA. PROF. FRIEDRICH VON THIERSCH, ARCHITECT.

This plate is copied from *Architektonische Rundschau.*

NOTES & CLIPPINGS

The Designer of the Crystal Palace. — A correspondent of *T. P.'s Weekly* writes: "In your review of Mr. Graves's '*Life of Sir George Grove*' it is incidentally mentioned that Sir Joseph Paxton originated the Crystal Palace building, taking as his model the Victoria Regia House, at Chatsworth, which 'the Duke of Devonshire ordered him to build.' Now Paxton was a gardener, and though he subsequently acquired a good deal of experience and knowledge in connection with the Great Exhibition of 1851 and the Crystal Palace, at the time the Regia House was contemplated, he had neither the experience nor the technical knowledge to design or erect what then was quite a novel form of construction. As head gardener at Chatsworth, Paxton had come into contact with the actual builder of the conservatories there, one Francis Clark, a Birmingham manufacturer, who was the first man to think of, design and construct a hot-house or conservatory where cast-iron took the place of wood in such structures. On receiving the orders of the Duke, Paxton put himself into communication with Clark, and a meeting was arranged at an inn midway between Birmingham and Chatsworth, where the matter was discussed, Clark roughing out a design of the proposed Victoria Regia House on a sheet of blotting-paper, which he took away with him and elaborated at his works in Birmingham. It is quite correct to say that the Great Exhibition Building, subsequently the Crystal Palace, was modelled on the lines of the Regia House, but how far Sir Joseph Paxton was responsible for the detailed constructional ironwork it is difficult to say; but he would have been a most remarkable man if he prepared the drawings for so complicated a structure. Among engineers it has always been considered that while Paxton gave the general idea to the scheme, it was Henderson, of Derby, subsequently one of the contractors for the building, who thrashed out the details. Regarding Francis Clark, he built many small hot-houses and conservatories in and around Birmingham before he was consulted by Paxton. As a business venture, however, the construction of these novel buildings was a failure. Clark was more of a philanthropist than a commercial man, and looked more to the success of his work than to making money out of it, and eventually he lost his all in the venture, and in the early fifties went to South Australia, where he died a few years after his eldest son established the well-known *Adelaide Register* newspaper. The family were well known in that city for their philanthropy and interest in all questions relating to the amelioration of the condition of the working classes. No doubt there are some of Francis Clark's family still living, who could corroborate this statement. The only man of that generation now living is the venerable Follet Osler, F. R. S., who was a great personal friend and benefactor to Clark. If any doubt exists as to the latter's share in the construction of the Regia House, it would be set at rest by examining the structure, as it was Clark's custom to cast his name on the girders. I had these facts from my mother, who was a cousin of Clark's, and knew the whole circumstances, as she was a frequent visitor to his house in Birmingham, and after his failure and departure to Australia it was the frequent subject of conversation among his relatives and friends that while his original ideas had been adopted for the then wondrous Crystal Palace, he should have died poor and unknown in a far-distant land, while honors were showered upon those who adopted them."

Dangers of Lawsuits. — The uncertainties of lawsuits are well illustrated by a case which recently occurred in an action for damages to perform a contract in the construction of a machine. Richard Roe agreed to build one for a certain sum from plans furnished by John Doe. Pending its completion the latter sold the machine to a third party. When the machine was finished it was found that Richard Roe had departed from the plans in several instances, so that it failed to do its work properly. John Doe demanded that it be remade so as to complete the contract satisfactorily, but this was refused by Richard Roe. The third party, in consequence of the defects, also refused the machine, so suit was brought against Richard Roe for damages amounting to a round sum. The case came to trial before a jury, who awarded a verdict in favor of John Doe for the full amount claimed, with interest from the date of the delivery of the machine to the third party. The case had been dragged through the courts nearly four years, and it then assumed a curious aspect. Richard Roe owed John Doe for failure to perform a contract; John Doe owed the third party the sum he had paid for the machine, which had been in the possession of the third party the whole time. A few days prior to the verdict and while the case was on trial the third party got tired of seeing the machine about, so he sold it to a junk man and put the proceeds in his pocket. By this act he acknowledged and accepted the machine as his property, to do as he pleased with, and thereby cut himself off from recovering anything from John Doe. The lesson conveyed by this case is one of interest to all, for it shows the danger of interference, by persons not interested, with lawsuits in course of settlement. The third party was not in the case at all, in this instance, his remedy being in a separate suit as against John Doe, but he undertook to settle the case himself, with the result noted. Property in litigation must be let alone until the title is conclusively settled. — *Metal Worker.*

Clays and Clay Industries. — The United States Geological Survey is about to publish, as Professional Paper No. 11, "The Clays of the United States East of the Mississippi River," by Dr. Heinrich Ries. He discusses briefly the origin, physical and chemical properties, methods of mining, purification, commercial value and uses of clay, and the geologic distribution of clays east of the Mississippi according to their rock derivation; and then he takes up the distribution of clays by kinds, and the description of clay deposits by States. He concludes with a summary of the clay-working industry east of the Mississippi, touching in turn and by States on the manufacture of common brick, pressed brick, fireproofing, roofing-tiles, terra-cotta, enamelled brick, floor-tiles, glazed tiles, vitrified brick, drain-tile, sewer-pipe, fire-brick and pottery. The largest brick-making region in this country is the Hudson River Valley in New York State, where nearly a billion brick are made annually. Pennsylvania leads in the production of pressed brick. Most of the terra-cotta comes from New York, New Jersey and Illinois — *Exchange.*

The Bismarck Monument, Berlin. — The memorial to Bismarck in the new cathedral near the Castle in Berlin has been completed in the clay by Reinhold Begas and is accepted. It will stand against a wall between two square engaged pillars with florid Ionic capitals. The centre of the panel shows a seated and draped Bismarck on a pedestal. Immediately in front is an ornate sarcophagus with low-relief on its long front. It rests on big lions' feet. To the right of the sarcophagus is a half-draped youth, a male "Fame," who holds a long trumpet with his left hand to his lips and with the right raises a drapery from the tomb. To the left is another half-draped figure, a female, "Muse of History," who leans her left elbow on the foot of the tomb and with her right hand props a panel and scroll against her thigh, bending her head down to read. Under the flowing drapery of Bismarck one sees that he is clad in a suit of mediæval armor. His right fist is against his right knee, his left hand lies on his left knee. The head is turned slightly to his right and the observer's left as he looks out with an imperious air. The pose of the figure suggests the "Moses" of Michael Angelo. The three figures make an agreeable pyramidal mass, in which the action is in the lower figures. Possibly the abrupt upward slanting line of the arm and trumpet of "Fame" interferes a trifle with the design, but the monument is another proof that Begas still holds powerfully the post of dean of German sculpture. On the tomb front an enthroned Germania is carved, who is receiving the crown from the federated German princes. There is nothing here to recall Wilhelm of Prussia — just Bismarck and Germany. —*N. Y. Times.*

Development of the Gas-engine. — Of late years the size of gas-engines has much increased. Many makers are now building machines of 2,500 horse-power, and are ready to double this efficiency. The development of large gas-engines is closely connected with the evolution of the fuel-gas processes, and it is noteworthy that the first gas-engines in England above 400 horse-power were operated with producer-gas, while many of the large gas-engines in Europe have been built for use with blast-furnace gas. In August, 1902, two English firms had under construction over fifty gas-engines varying in size from 200 to 1,000 horse-power. A classified list of engines made or making shows 327 such, with an aggregate horse-power of 182,000, or about 560 horse-power per machine. The last volume of the United States census reports 18,500 combustion engines in the country, with a total capacity of 165,000 horse-power, or only about 9 horse-power on the average. This state of things is not likely to last long. One American firm has already sold over 40,000 horse-power of large engines, most of them of 2,000 and several of 1,000 horse-power. Another has recently built two 4,000 horse-power gas-compressors and a number of 1,000 horse-power gas-engines. The gas-engines of the large sizes are extensively used for generating electric light and power, but there is a decided tendency to employ the smaller sizes direct as motors. Cheap fuel-gas processes will bring the gas-engine to replace the electric-motor for very many purposes, and we may look for development along these lines in the near future. — *Journal of the Franklin Institute.*

The late John Donoghue, Sculptor. — The tragic end of John Donoghue, the sculptor, recalls the gallant struggle he made in Rome to embody in a gigantic statue a cosmological idea — "The Spirit of the Abyss" — and the extraordinary adventures the colossal figure had while the sculptor was trying to get it to Chicago for the World's Fair. Donoghue conceived the design on so tremendous a scale that nothing would do for a studio but one of the old Roman baths. He was from Chicago himself, and knew the love of his fellow-townsmen for everything that is big. To those who deprecated the size of the winged brooding figure he replied with invincible optimism that Chicago would find a place for it, even if it had to stand without the grounds of the Exposition. Perhaps he was right in his belief · he claimed that a site had been granted. But when the transport from the United States reached Italy to take away the work of American artists Donoghue was not ready, and the ship had to sail. Then he determined to get it over as freight by an ordinary steamer. It was too large for the railway, and had to be sawed into sections. At last he got it to Genoa and aboard of a steamer, but there was no one to guarantee payment for the freight. Even then Donoghue's pluck did not fail him. With the lightheartedness which in the course of his career gained him so many friends, he paid that freight with promises, and returned to New York to await the coming of his statue. But here his luck turned. "The Spirit of the Abyss" was, indeed, unloaded on a dock in Brooklyn, but no one could be induced to take it out of pawn, and so it perished. One must not suppose, however, that this blow saddened or soured the buoyant spirit of the sculptor of "The Dancing Sophocles." Only during recent years, when he found that his designs were not successful, did he lose heart and give up the struggle. His early sketch, "Hannibal swearing at the Altar Vengeance on Rome"; his "Sophocles dancing Nude at the Triumph for the Battle of Salamis," and his "Athlete," modelled from the pugilist, John L. Sullivan, were sculptures that gave warrant of greatness. All that Donoghue seemed to lack to attain substantial success was steadiness in labor. A vein of self-indulgence was perhaps the only serious flaw which caused so much promise to fail of attainment. — *N. Y. Times.*

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"Topical Architecture"

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is devoted to

"Gates and Railings"–VIII.

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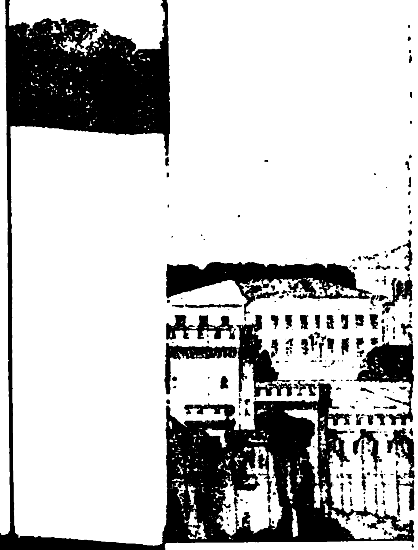

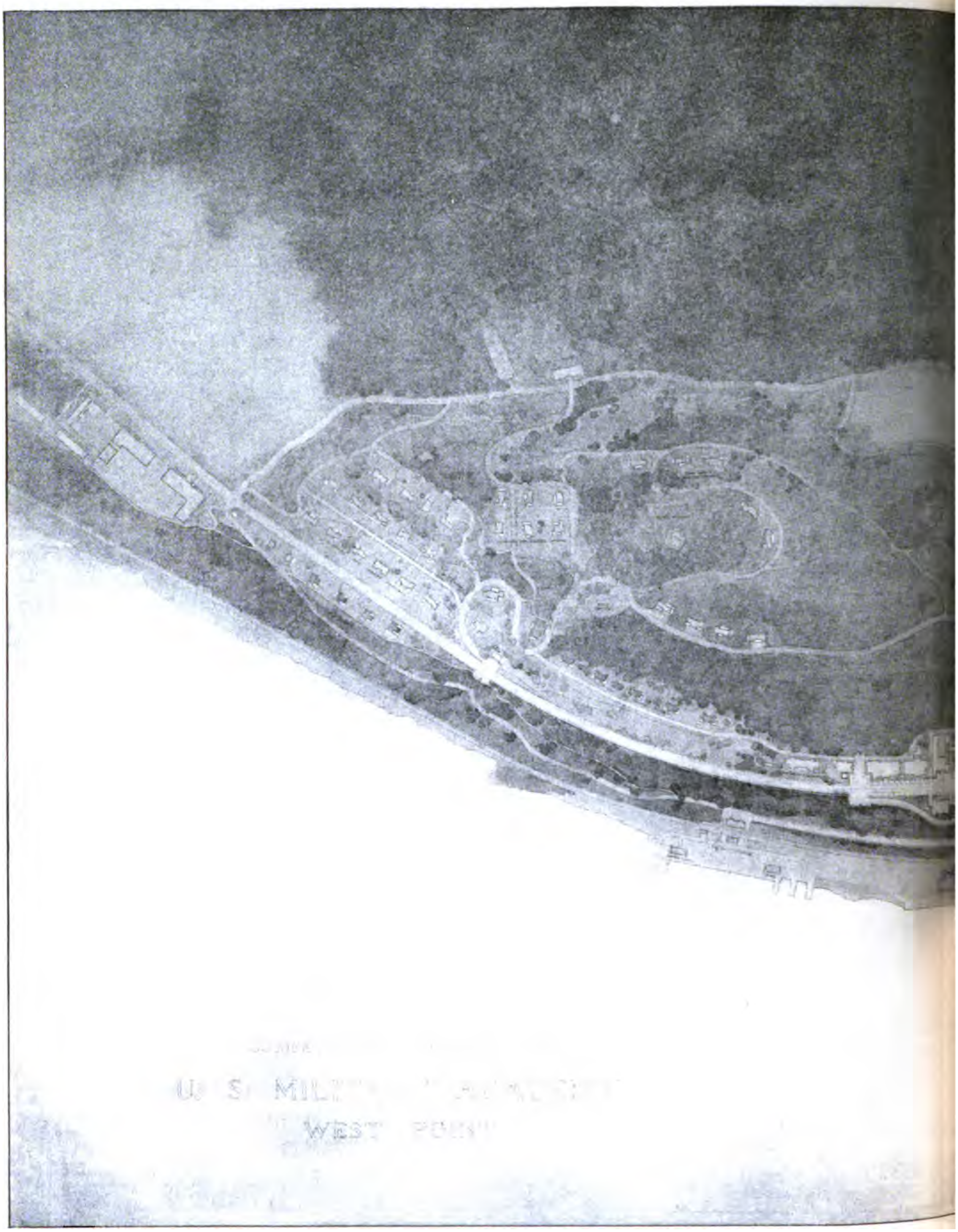

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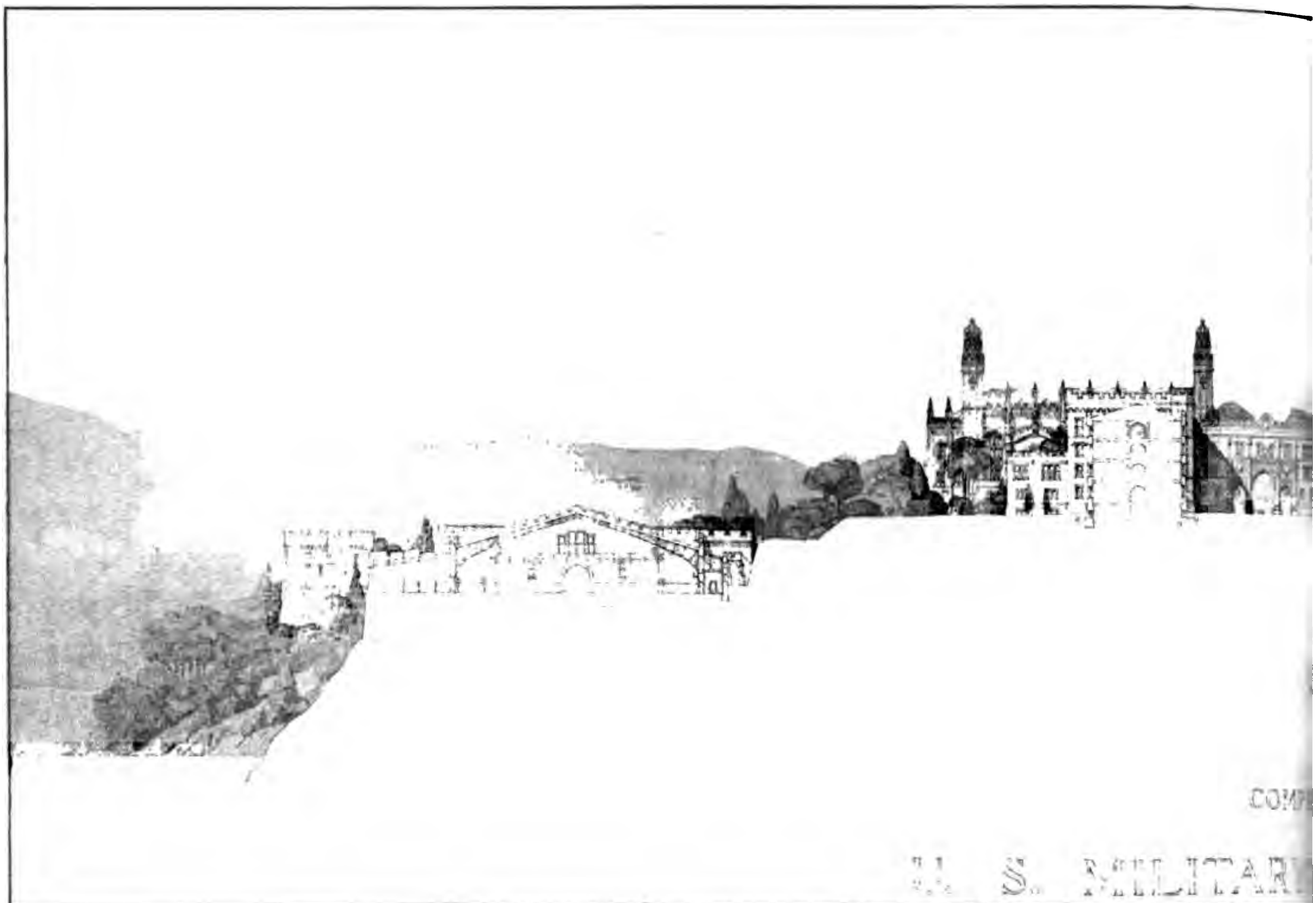

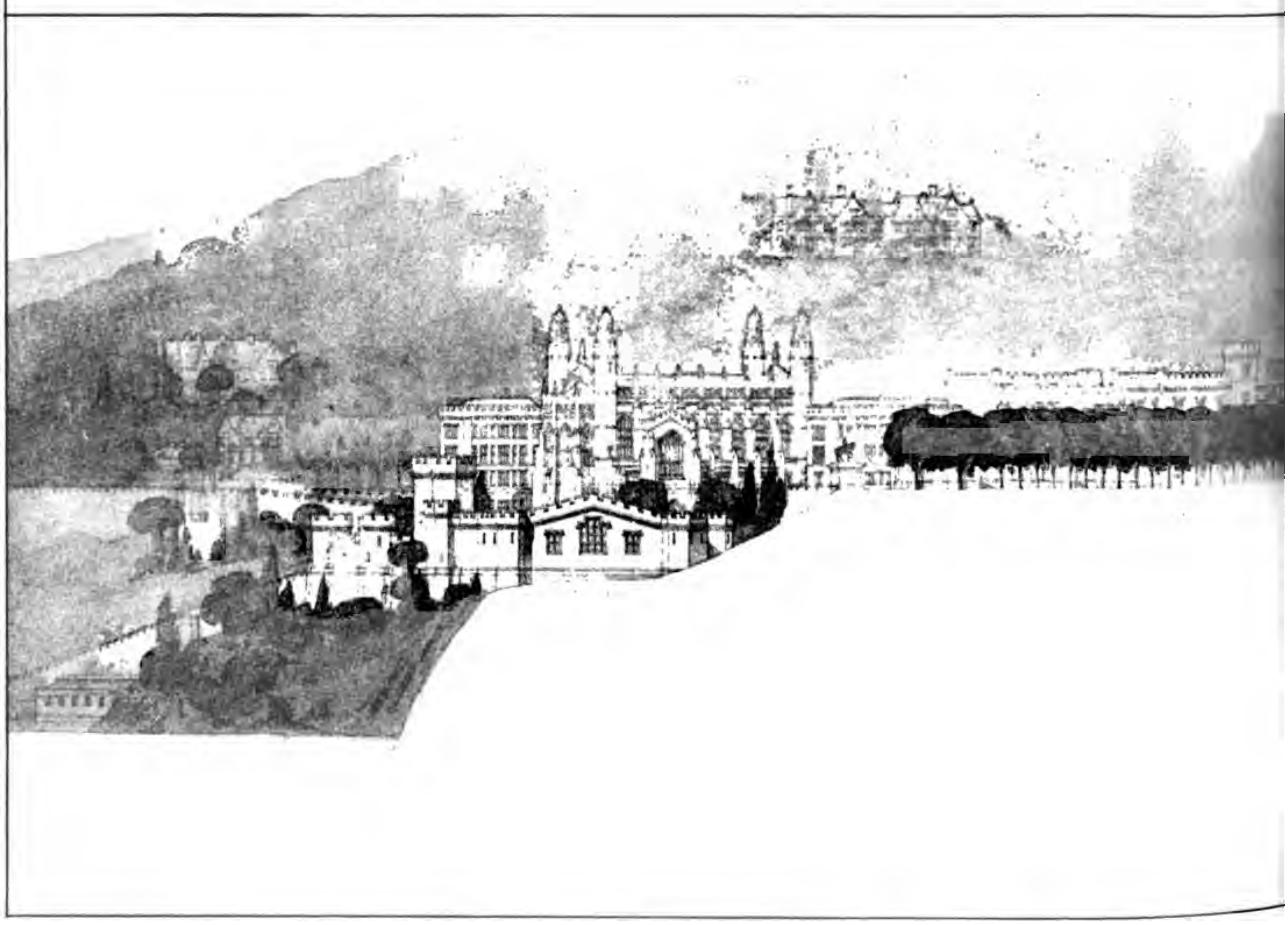

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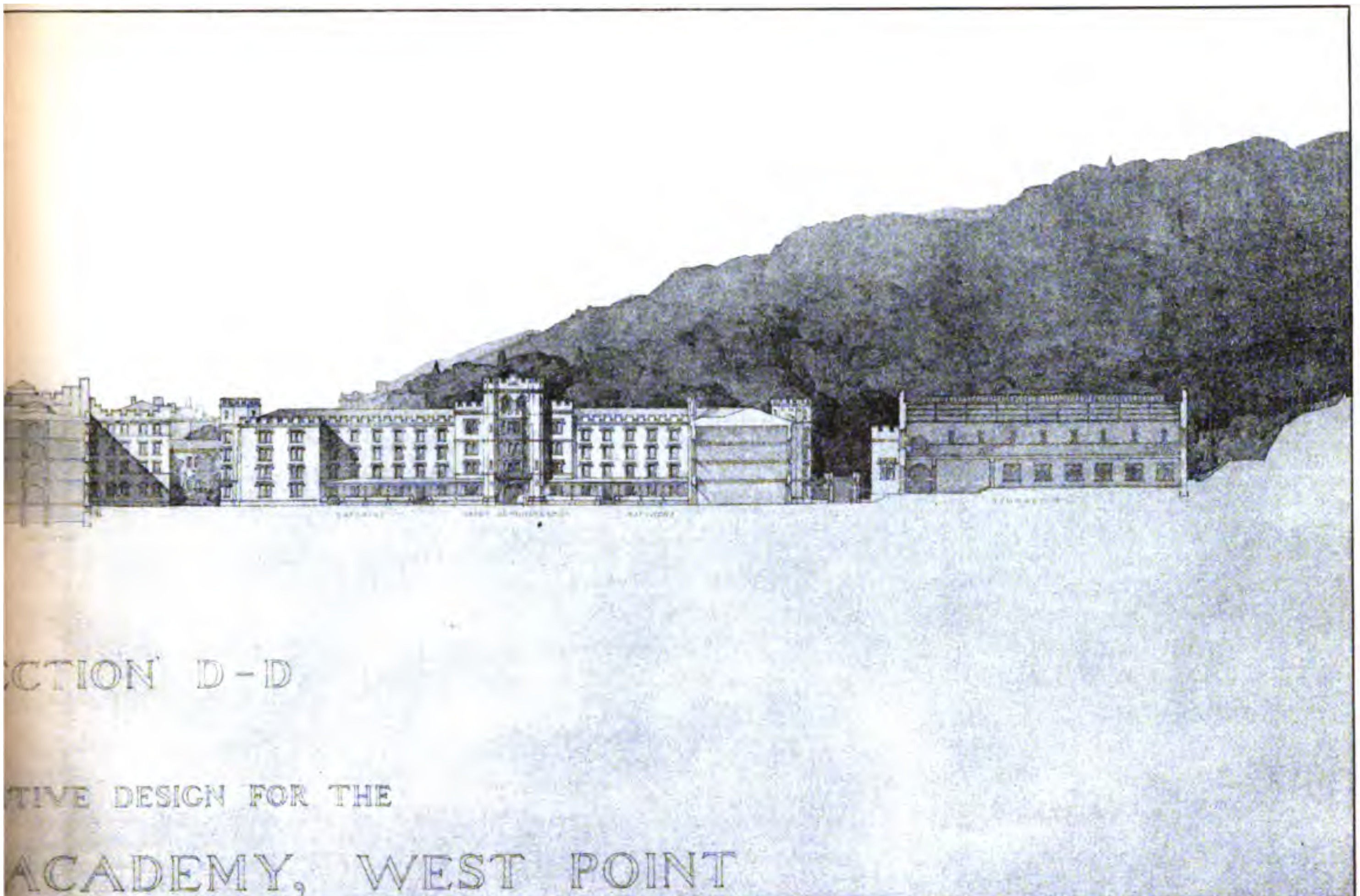

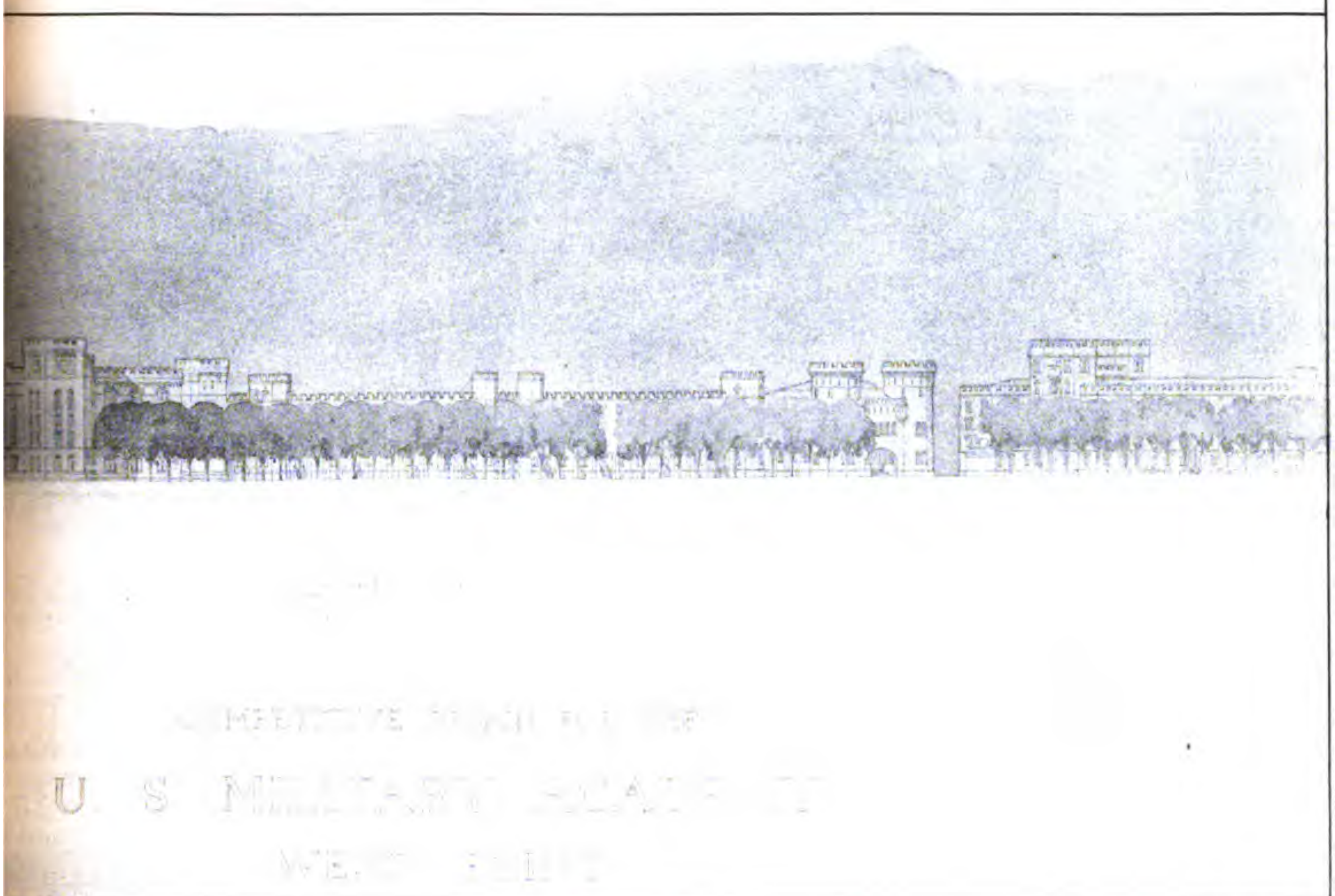

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THE AMERICAN ARCHITECT AND BUILDING NEWS

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CONTENTS

MR. DISTRICT-ATTORNEY JEROME, in his endeavors to get evidence of extortion and bribery, has been overwhelmed with such a mass of testimony that he seems to have given up the matter in despair, and says that the law cannot reach such cases, but that the cure of corruption must come by an improvement in the tone of public morality. It is not likely that the tone of public morality will be improved by the knowledge that bribery and blackmailing are lawful means of making money; and those citizens who deplore corruption might with advantage join those who suffer directly from it in trying to check it. President Roosevelt's saying, that publicity is the best cure for trusts, the truth of which is being illustrated every day, might equally well be applied to bribery and extortion, if it were not for the laws, which, by making it a crime to offer a bribe, prevent anybody from accusing himself by telling about extortion practised upon him, while they do nothing to diminish the evil which they pretend to be aimed at.

WE are inclined to suggest that a partial remedy, at least, for the trouble might be found in relaxing, or even abolishing, the criminal statutes against bribery, and substituting a civil process, by which a person compelled to pay money under threat of injury or annoyance, or to purchase the favor of public officials, might recover back the amount paid, with costs. Such a provision would agree in principle with the common law rule, that payments made, or receipts given, under duress, are void, and that money so paid may be recovered, and receipts set aside, at any subsequent time; and the spectacle of a public official, sued in the courts to recover back money paid him in consideration of the award of a contract, or of a walking-delegate sued for return of money extorted, would be far more effective than a criminal action, both in punishing the wrongdoers, who would be held up before the world in their true light, and in deterring those disposed to do wrong, who would have much more reason to fear civil suits for recovery of money illegally taken than criminal suits, in which the plaintiff, under the statutes of most States, would have to acknowledge himself also a subject for penitentiary treatment. To architects and engineers the subject is one of vital interest, for the number of contracts and commissions, the award of which depends upon "seeing" somebody, or "making it right" with some one else, increases every day; and in proportion to the increase of transactions of this kind the income of professional men who will not sell themselves or their clients diminishes.

THE building situation in New York seems to improve slowly. All the marble-workers' unions have signed the arbitration plan. These unions have about four thousand members, the greater part of whom will find immediate employment. Meanwhile, the walking-delegates have begun making "charges" in the newspapers against the Employers' Association. This is quite a different matter from threatening to "make the employers' hair curl," and, in the present state of public opinion in regard to walking-delegates, an appeal to it is rather the resort of desperation. At the same time that the unions are gradually deserting their noisy "champions," the non-union men are plucking up courage. Even in Parks's own trade, the housesmiths are deserting the union standard and applying for work in considerable numbers, fifty having been employed at once by the Thompson-Starrett Company.

OUR readers will be glad to hear that the business of the Norcross Brothers Company is to be continued, a satisfactory arrangement having been made with its creditors. Under this arrangement, the building contracts of the old corporation are to be assumed by a new corporation, which is to take the Worcester shop and equipment, the office furniture and fixtures, the cash on hand and in the banks, and the accounts receivable, including sums due on contracts and completed work, with the good will of the business, which is to be continued under the direction of Mr. O. W. Norcross, as manager, at a reasonable salary. In addition to this corporation a second one is to be created, known as the Norcross Properties Company, which is to hold and manage the various quarrying, manufacturing and other subsidiary enterprises belonging either to the Norcross Brothers Corporation or Mr. Norcross individually. All these enterprises are believed to be solvent, and to have substantial earning power, and it is proposed to mortgage them to secure bonds, carrying six per cent interest, which the creditors of the present Norcross Brothers Company agree to accept for three-fourths of their claims, the remaining one-fourth to be paid in cash by the new construction company. This settlement will relieve the finances of the new construction company, and enable it to complete its contracts profitably. As the Properties corporation owns all the stock of the Construction Company, the profits of the business will accrue to it, and will be used for retiring the bonds, which, by a provision in the indenture, may be drawn each year for payment to a specified amount. After all indebtedness has been paid, the property is to be handed back to Mr. Norcross and his family.

THE death of Mr. James A. Norcross, for many years the senior partner of the building firm of Norcross Brothers, saddens what would otherwise be the very satisfactory solution of the difficulties of the great corporation which succeeded to the business of that firm. Mr. James Norcross's connection with the operations of Norcross Brothers ceased some years ago, when he retired altogether from active business, to devote himself to the management of his large property. Although much less known to architects than his younger brother, as his duties, during the period of his connection with the firm, kept him closely confined at the office, many of the profession will remember him as a quiet, considerate man, who inspired confidence and regard.

WE have not felt particularly disposed to notice the death of James McNeill Whistler, partly because his connection with architectural work was very slight, and not extremely happy, and partly because we think that the attention paid by the public to artists notorious mainly by their eccentricities detracts from the reputation of the greater ones who, finding their time and their thoughts fully occupied with the effort to express in form or color the beauty which fills their minds, have neither leisure nor inclination to advertise themselves. There were, however, some things about Whistler's life which have a professional interest. One of these is the circumstance that he married, late in life, the widow of E. W. Godwin, one of the cleverest architects of the last generation. Mr. Godwin was for many years connected with the *British Architect*, and in the columns of that journal we find the best notice of Whistler that we have yet seen. It appears that his married life was particularly happy, so that his later years were, we may hope, free from the "sadness" which, as he himself said, attended the greater part of his life, and perhaps inspired the brutal sarcasms for which he was renowned. It is related of him that he once asked a young lady pupil if

she really saw things as she painted them. The poor girl innocently replied that she did. "What a horrible world you must live in!" said Whistler. Our readers may detect a similarity between this story and some told of other distinguished artists, and it will, perhaps, be judicious to remind aspiring youth that a sharp tongue is by no means a necessary, or even a desirable part of a painter's outfit, and that consideration for others invites consideration for one's self. The history of the famous "peacock room" affords another illustration of this principle. This room formed a portion of a house at Prince's Gate, in London, belonging to the late Mr. Leyland, a wealthy ship-owner, and a kind, faithful friend of Whistler, as well as of Rossetti. Most of our readers have, undoubtedly, seen photographs of this room, the decoration of which consisted of a mass of peacocks' feathers, with a rather insignificant figure as a centre. As a piece of architectural decoration the room was of no interest whatever, and, as a bit of color, it would probably be advantageously replaced, to modern eyes, wearied by the eternal repetition of peacock harmonies, by a good Oriental rug; but, as a startling novelty at that time, it had a great success. Soon after the completion of this work, Whistler quarrelled with his benefactor, and had the ingratitude and insolence to exhibit a life-size portrait of him in the character of Satan, with horns, hoofs and tail.

MR. WILLIAM DE LEFTWICH DODGE, a very well known New York artist, has brought suit in a case which will excite the sympathy of artists generally. Mr. Dodge, it seems, was engaged to execute certain mural paintings in a hotel in Canada. He submitted sketches, which were approved, and carried out the work in accordance with them. Now it appears that the owner, or the architect, or somebody else, wants the pictures altered. In one of the large groups, as Mr. Dodge says, he is asked to remove the hats from the figures. In another, which represents a sort of procession, with flags and other objects against the sky, he is told that he must paint out the flags, so as to give more sky, making his figures stand up, as he says, like a row of tin soldiers, in silhouette against an unbroken sky. Another singular request is that he shall repaint a group, representing General Wolfe reading Gray's Elegy to his soldiers, on the night before the battle of Quebec, so as to give it an effect of bright sunshine, whereas the historical fact is that the reading took place on a dark night, which Mr. Dodge only ventured to take the liberty of changing to a moonlight scene. The architect, according to Mr. Dodge, wishes to have these changes made to lighten the room in which the pictures are placed, and threatens to have them repainted by local talent. Probably the architect has something to say for his side of the matter, but the artist seems to have a real grievance.

DR. LUDWIG MOND, famous as a chemist, and as the inventor of the process for producing a cheap fuel-gas, known under his name, died in Rome a few days ago. Dr. Mond was born at Hesse-Cassel, in Germany, in 1839, and studied at Marburg and afterwards at Heidelberg. Like many of the modern German chemists, he devoted himself to the practical application of his scientific knowledge, and soon became distinguished for his inventions in industrial chemistry. In 1862 he went to England, to introduce a process for recovering sulphur from alkali waste; and, five years later, settled there permanently. In 1872, he introduced the Solvay process for manufacturing soda, and was soon at the head of the largest alkali works in Great Britain. Since then he has devoted himself to the solution of many practical problems, obtaining various patents, relating, particularly, to the economical utilization of coal, by which, it is said, he derived twice as much force from a given quantity of coal as was ever obtained before. The Mond gas system is in successful operation in England, and has been introduced into this country, but its merits are, probably, very inadequately recognized as yet.

A STRIKE insurance company has been formed in Louisville, Ky., after the pattern, apparently, of the German companies. Although its place of business is in Louisville, its members include manufacturers from various States, from New York to Indiana. The risks assumed are moderate, and the expenses of management are restricted to a small percentage of the premiums; but there is a mutual provision, by which assessments can be laid on policy-holders, if necessary. The newspapers give, as yet, only very incomplete details of this interesting experiment, but it is to be hoped that its success may be such as to lead to the foundation of similar companies in other places. Nothing helps a reform so much as making it for some one's interest to promote it. As the death and disability insurance companies in Germany have, simply as a matter of dollars and cents, reduced the average number of deaths from tuberculosis by a very large percentage, so the officers of strike-insurance companies, being neutrals, so far as the parties to strikes are concerned, and having an important interest in preventing strikes, by smoothing over misunderstandings or otherwise, may, very probably, do much to alleviate the greatest curse from which modern industry suffers.

A WELL-KNOWN firm of architects has had an unfortunate experience in collecting fees. The firm, several years ago, prepared plans for a court-house. The building of the court house was abandoned, and the architects sued for the services that they had rendered. The case dragged along for several years, and the elder member of the firm, in whose name the suit was brought, assigned one-half the claim to a certain attorney, and the other half to his son, the other member of the firm. Later, the attorney purchased the son's interest in the claim for one hundred and fifty dollars. Finally, the case was decided in favor of the architects, and the sum awarded them, amounting to nearly fifteen thousand dollars, was paid into court, and turned over to the attorney to whom the claim had been assigned. Naturally, the son, who had sold a good claim for more than seven thousand dollars for about one-fiftieth of its value, felt himself aggrieved, and tried to prevent the payment of the money to the attorney, but was unsuccessful.

THIS is certainly the age of large schemes. The Bridge Commissioner of New York and his architect, Mr. Hornbostel, have plans already prepared for buildings around the New York end of the East River Bridge which will cost, with the land, about fifty million dollars. The plans contemplate the removal from the City Hall Park of all buildings except the present City Hall, which is to remain as the Mayor's office, the other city departments being accommodated in a new and magnificent group of buildings extending from Chambers to Duane Street, and comprising a terminal station for the bridge, and a "campanile," six hundred and fifty feet high, containing forty-two stories of offices. This structure, we are told, will "dwarf" the thirty-story Park Row Building, close by, as well as the other "sky-scrapers" in the neighborhood, and it is expected that the general scheme, if carried out "will create a plaza that will surpass in magnitude and general artistic effect even Trafalgar Square, in London, or the Place de la Concorde, in Paris." That the new "plaza" will be different in "artistic effect" from the spaces mentioned every one will concede: whether it will be superior is a question of taste. We may say that the "artistic effect" of Trafalgar Square is something that we never heard mentioned before. There is no doubt that it is large, very much larger, we should say, than the New York City Hall Park, even with the addition of Chambers Street, which it is proposed to incorporate with it; and it has a monument in the middle which would unquestionably be "dwarfed" by a forty-two story "campanile"; but the low and comparatively insignificant buildings surrounding Trafalgar Square are so totally different from the forest of "sky-scrapers" about City Hall Park that it is hardly possible to make any comparison between them. With the Place de la Concorde, also, no comparison is possible, for the reason that the Place de la Concorde has buildings only on one side, which is occupied by the low, balanced masses of the Garde Meuble and the Automobile Club, with the front of the Madeleine appearing between them; the three remaining sides bounding on the vast areas of the Garden of the Tuileries, or the Champs-Elysées, or the open space of the river, without a suggestion anywhere of the huge cliffs of brick and mortar which shut in the City Hall Park on all sides. To obtain, in the lower part of New York, an effect suggesting the air and sunshine of the Place de la Concorde, the Battery Park should be chosen for enlargement, instead of the City Hall Park; and the new municipal buildings, arranged across the upper end, facing south across the Park and the harbor beyond, would have an effect, even without the addition of a "campanile" for dwarfing purposes, that could not be surpassed in any great city in the world.

MEZZOTINTS.[1]

THERE are two distinct ways of engraving metal plates, so as to be able to make prints from them, the *intaglio* and the *relief*.

The intaglio forms of engraving comprise line engravings with the burin, dry point, and all forms of etching with acid.

The relief forms of engraving comprise such blocks as those cut for Pigouchet's "*Books of Hours*," in the fifteenth century, and those etched by William Blake for the cheap reproduction of his poems, in the eighteenth century. The first of these two kinds of engraving has been most used so far as metal is concerned, as wood is easier and cheaper to make for relief blocks.

To print from a metal plate, engraved in the intaglio manner, a strong pressure is required, but to print from a relief block only a slight pressure is required, and in either case an impression can be made either in white or in black, according to the manner in which the intaglio or the relief block is inked and printed.

A mezzotinted metal plate is at first clearly an intaglio, but as the rocking proceeds and becomes closer, the resulting burrs are actually raised above the level of the normal surface, and to that extent the plate becomes a relief block. Like a relief block also it will print black, and as the surface is scraped away or burnished down, so also the resulting effect on the print is towards white.

The difference of the commoner lines made on a metal plate for the purpose of reproduction by printing shows clearly on one of my diagrams (Fig. 1). The upper line is a clear cut out of the surface of the metal, a thread of corresponding size to the cut being removed. The next line shows the effect of an etched line on metal; in this case the metal is first covered with a thin coating of wax, specially prepared, and upon this a design is marked with a sharp point or needle, cutting down to the copper. Then the plate is dipped in a solution of nitric or other acid, which attacks the metal in the places where the wax coating is removed and corrodes it away rapidly. If the plate is left too long in the acid this will undercut beneath the wax and make broad lines. I mean to say that the acid will, of itself, give other effects than those intended by the etcher, and of course it removes some metal. The next shows a dry-point line, no metal being removed, but only a scratch made, throwing up on one side the same amount of metal as is moved by the hard scratching point; the action is similar to that of a plough driving a furrow and throwing up a ridge. On the metal this ridge is called a burr, and it has a very important effect on a print as it catches a quantity of ink behind its sheltering crest, and produces a thick, soft effect on the paper.

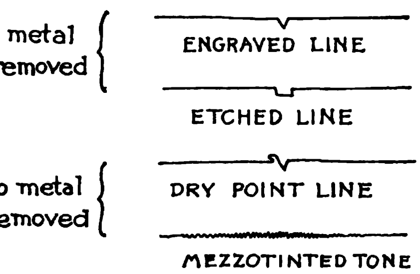
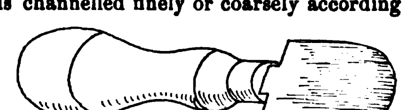


Fig. 1. Diagram showing the Microscopic Forms of Lines cut on Metal.

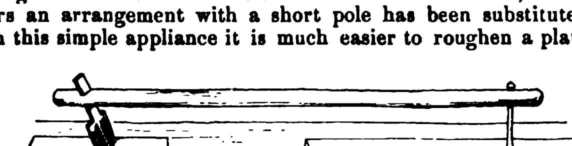
The mezzotinting process removes no metal, except by accident, as, for instance, when the rocking is carried too far, then the burrs will get so small that they are apt to tumble off and leave only a roughened depression.

The most distinctive tool used in the process of mezzotinting a metal plate is called a "rocker." It resembles a small spade, and is bevelled at the broad end, which has a curved outline (Fig. 2). The flat side of the rocker is channelled finely or coarsely according to the wish of the engraver, and whenever the tiny teeth get worn down or perhaps broken in places, it is easily remedied by simply sharpening the edge as if it were a chisel, the effect of the channelling being to produce a toothed edge resembling that of a tooth-comb. In the early times of mezzotinting rockers were made so as to be used in the hand, but of late years an arrangement with a short pole has been substituted, and with this simple appliance it is much easier to roughen a plate than it was when the rocker was handled like a gimlet (Fig. 2a.) The rocker, as now used, is no doubt a development from a roulette. The first mezzotints were roughened by means of roulettes held in the hand. They were of many different forms, ranging from the small tooth wheel like the rowel of a spur, with a single line of points, to the broad disc, resembling a small garden roller, which was used by Prince Rupert and his followers. Between these two extremes the varieties of roulettes were many, and it is likely that each mezzotinter designed the form which he preferred for his own use (Fig. 3). Roulettes were first used to roughen metal plates by L. von Siegen, who found that they were able to produce an effect, rapidly and easily, which, if done point by point in the known "*pointillé*" manner, would be slow and difficult.



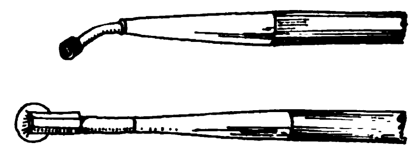
ROCKER.

Fig. 2.



POLE ARRANGEMENT OF ROCKER

Fig. 2a. Pole Arrangement of Rocker.

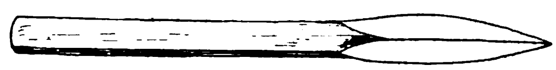


ROULETTES.

Fig. 3.

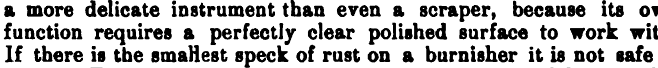
The most valuable use of a roulette is not in its use alone, but as an accessory to rocked work; being quite small it is invaluable to deepen the roughening in particular places, and it is also of great use in the event of too much scraping having been accidentally done. In former days mezzotinters generally laid their own grounds, very often only working them when required, but now the whole of the plate is evenly colored with the rough grain, and this laying of a mezzotint ground is, moreover, done professionally, so that a modern engraver works on a ground with which he is in doubtful sympathy. I think that the professional laying of a mezzotint ground militates much against the true art value of the work of any engraver who works upon it. It is, however, a slow and tedious process, the plate having to be crossed some eighty times, and in these days of hurry we must perforce forgive it, as very few mezzotinters could, or would, spare the time to do it for themselves as they ought to.

The next important tool used in the production of a mezzotint is a scraper (Fig. 4). Like the rocker, the scraper is of hard steel. It is a short sharp cutting-edge set in a handle, and by its use the mezzotinter scrapes away the roughness on his rocked plate as much as he considers necessary. If the scraping is carried far enough all the marks made by rocker or roulette can be erased, and every scrape, when printed, shows more or less as a light place. Scrapers should be very carefully kept dry, as the sharp edge soon loses its value if any rust gets on it, and instead of a clean sharp cut, it makes a jagged scratch. The main difficulty in engraving a mezzotint is in the use of the scraper, so much so that the phrase "scraped" by so-and-so is often heard, referring to the engraver. Indeed it may almost be said, especially now that the grounding is usually done professionally, that the art of the mezzotinter consists of his skill with the scraper alone. There is, however, one more instrument that is a dangerously powerful one. Dangerous because it can be made to do easily work of the same kind as can be done with some difficulty with the scraper. This instrument is a burnisher, and the work of flattening down the small roughnesses which are left by the scraper falls to its lot (Fig. 5). A burnisher is a more delicate instrument than even a scraper, because its own function requires a perfectly clear polished surface to work with. If there is the smallest speck of rust on a burnisher it is not safe to use it. Early mezzotinters were by no means so careful about this as they might have been, and the result can be seen in numberless instances where places intended to be pure white show hair marks along their length. Such marks are probably due to small inequalities on the surface of the burnisher.



SCRAPER.

Fig. 4.



BURNISHER.

Fig. 5.

A hard-steel burnisher acting on soft copper which has been rocked, is capable of polishing out all marks, and, consequently, of creating a form on the plate which will show white upon a print. Such a small point will be, however, a depression on the copper, and although polished, nevertheless a layer of ink is always likely to remain in it, so it is advisable to go over all such points with a soft wooden point armed with a little whitening, in order to get every atom of the ink out. Such white spots can often be seen on the points of noses, and about the eyes, and for greater effect they are also often helped by the near neighborhood of burin work, sharp and black.

Practically, then, a mezzotinted plate is burred all over, and the art-work upon it is done by means of scraper and burnisher, the effect of each of which is towards lightness. The more it is worked upon by these two instruments the lighter the print will be, and in a few places where greater strength of tone may be required, a roulette can be effectively used to restore the requisite darkness. Many fine

[1] A paper by Cyril Davenport, F. S. A., read before the Society of Arts May 19, 1903, and printed in the *Journal* of that Society.

mezzotints owe much to line engraving, dry-point and etched work, but when any of these are found in any considerable quantity the engraving should properly be called in "mixed manner."

Much importance attaches to the inking of a mezzotint plate, more importance than has been credited to it. A bad inker and printer cannot make a good print from the finest plate, and a good inker and printer can make a decent print from a very bad plate.

Mezzotints were printed in color at an early period in their history. Joannes Teyler, Professor of Mathematics in the military college at Nimeguen, at the end of the seventeenth century, printed several of his plates in color, inking each plate carefully in the proper place with properly colored ink. Then, a little later, J. Christophe Le Blon began three-color work. He engraved a separate plate to carry each color, and used red, yellow and blue, with sometimes a key-plate in neutral tone. At least one of these plates was mezzotinted, but they are sometimes etched. He described his process in a tract entitled, "Coloritto," published about 1723.

The finest color-work of this kind is now done for the "Société des Amis des Livres," at Paris; the registering of their plates is marvellous, and the effect beautiful. In England, Mr. Cadbury Jones endeavored some short time back to introduce color-printing for metal plates in the manner of Joannes Teyler, the plates being inked in the different colors, but his endeavors did not meet with the success they deserved.

The early exponents of mezzotint work were all amateurs. The first mention of it is contained in John Evelyn's "*Sculptura*," published in London in 1662, and he says it was described to him by Prince Rupert. Prince Rupert engraved a small head of "The Executioner," taken from the larger plate, for Evelyn's book, and this is, I believe, the first mezzotint ever published as a book illustration. Evelyn does not describe the process, but it was described by Alexander Browne in a book called "*Ars Pictoria*," published by him in 1669. In this description no mention is made of a scraper, but the directions advised the use of a burnisher for lightening the plate.

Prince Rupert was for a long time considered to be the inventor of the mezzotint, but it is now known that Ludwig von Siegen, an officer in the Hessian army, used a system of engraving which ultimately developed into true mezzotint. An excellent account of Von Siegen and his invention can be found in Léon da Laborde's classic "*Histoire da la Gravure en Manière Noire*," and in this book is a fac-simile of a letter which was sent to the Landgrave of Hesse, accompanied with a print of a portrait of his mother, the Landgravine Amelia Elizabeth, executed in the new manner. This print, of which I have an excellent slide, is, in my belief, all worked by means of a small single-line dotting roulette. Von Siegen's letter is dated August 19, 1642, and his print is considered to be the first important mezzotint. In places where the roulette has been used closely and strongly a certain velvety effect is found, and this no doubt, being entirely new, gave the idea a start, which was followed up by Prince Rupert and others, and eventually became the chief characteristic of mezzotint work. I take it, however, that in all these early prints the mezzotinting or rouletting has only been done in the places where it was wanted, so that scraping was not necessary, whereas in a true mezzotint the rocking or roughening is systematically done all over the plate and afterwards cut away by means of a scraper as required. In Von Siegen's letter there is no mention of a scraper.

Prince Rupert learned the new art from Von Siegen, and rapidly improved upon his master's work. Several of his plates are powerful and cleverly managed, the mezzotinting is only put where it is wanted, and there is little or no use of the scraper. The use of the burnisher on metal was well known in Prince Rupert's time, and any corrections he found it necessary to do upon his plates were probably done by means of this instrument. Prince Rupert most likely used a roller with a grooved surface to roughen his plates, and some of them show broad curved impressions from such an instrument. The early mezzotinters were not only amateurs but Dutchmen as well, the Canon von Fürstenburg being a contemporary with Prince Rupert. Wallerant Vaillant, a Dutch portrait painter, assisted Prince Rupert, and himself worked a few plates in the new manner, but neither his work nor that of the Canon was particularly good. Under one of his plates, a portrait of Prince Rupert, occur the words "Prins Robdert, vinder van de Swaarte Prent Konst." The Van Somers and Abraham Blooteling also worked in England; in the case of Blooteling this is particularly fortunate, as his work is in every way excellent, and in consequence of his working here so largely, we count him in the list of English mezzotint engravers. Blooteling was the first to perceive the great artistic possibilities of the new process of engraving, and he taught an assistant, Blois, to prepare his grounds, and these are well and evenly done. Also Blooteling used the scraper, which does not seem to have been used before in the particular way of lightening on all-over darkened plates. The question naturally occurs here as to whether it is possible to say from a print whether a pale place on a mezzotint has been produced by means of a scraper or by a burnisher. I have not time now to go into this question, but will only say that there are certain signs on all such pale places by which it can be said, with some certainty, how they have been produced. Blooteling came here in 1673, and his work quickly became much admired by line engravers, many of whom took up the new process as an amusement; but gradually its powers became more and more appreciated until at last our native engravers became so preëminently skilful that mezzotinting was known as an English art.

The early mezzotinters engraved principally after their own drawings, but very soon they became interpreters of the work of other men. At the same time, in a first-rate mezzotint, we must acknowledge a considerable amount of original merit, in addition to the skill of the copyist.

Like the Dutch the first English engravers in mezzotint were amateurs, the first two being William Sherwin and Francis Place. Sherwin counts first because he dated one of his prints, a portrait of Charles II, "1669," and Place dated none of his, though they may have been done earlier than Sherwin's. Isaac Beckett may be considered the first English professional mezzotint engraver. He worked about 1670, and took pupils, among whom was John Smith, afterwards one of our most famous engravers, and a very prolific one.

After Isaac Beckett English engravers in mezzotint increased rapidly in number, and they gradually took the art away from its Dutch votaries: at the same time, the foreigners remained here for some time, and executed much good work. Among these were some well-known artists, Vandervaart, Verkolje, Van Bleek and Van Haeken.

During the eighteenth century we do not find the same preponderance of Dutch workmen, but the English names occur almost exclusively. In the beginning of the century John Smith worked most successfully, and was followed by a numerous band of famous engravers, many of whom, owing to the revived appreciation of mezzotints, are now well known.

John Faber, junior, is best known for his engravings after the portraits of the members of the Kit Cat Club painted by Sir Godfrey Kneller. The club was originally political but soon lost that distinction, and the club-room in Jacob Tonson's house at Barn-elms was too low to admit the usual full-length figures, so Kneller made his canvasses 28" x 36", and christened this size of picture after the name of the owner of the original meeting-house, Christopher, or Kit Cat.

About 1714 George White inaugurated the introduction of etching into the mezzotint world; he strongly etched his subjects before putting in the mezzotint tones. This principle was afterwards much followed especially in the case of large subject pieces.

A large proportion of eminent eighteenth-century mezzotint engravers came from Ireland, the most eminent of whom was James MacArdell. He largely engraved after Sir Joshua Reynolds, who himself declared his belief that he would be immortalized by MacArdell's work. Then there was his fellow-pupil with Brooks, Richard Houston, and Thomas Frye, who engraved large portrait-heads after his own drawings about 1740. Other noted Irish engravers were E. Luttrell, Thomas Beard, W. Baillie, John Murphy (who, unfortunately, has only left a few rare plates, all very fine), J. Brooks, Ed. Fisher, Ch. Spooner, J. Dixon and Richard Purcell.

These engravers and their English contemporaries of the eighteenth century have left an unequalled series of magnificent portrait-engravings after the works, particularly of Sir Joshua Reynolds, P. R. A., J. Hoppner, R. A., Sir T. Lawrence, P. R. A., G. Romney and T. Gainsborough, R. A., all notable for the beauty of their female types, and in the matter of subject pictures they have engraved chiefly after the works of G. Morland, W. Hogarth, Benjamin West, P. R. A., and J. Zoffany. Among the most notable of the English mezzotinters of the latter half of the eighteenth century, Valentine Green is one of the best known. He had several pupils of whom John Dean, one of the most delicate of engravers, is perhaps the most eminent. In 1777, Richard Earlom engraved a set of mezzotinted etchings after Claude Lorrain, one of which I have to show you as an experimental slide. J. R. Smith, son of Smith of Derby, was one of our greatest engravers in mezzotint; he made some plates after his own drawings, but is chiefly known for his beautiful interpretation of the works of Sir Joshua Reynolds.

J. Walker, Jonathan Spilsbury and C. Turner were all first-rate engravers in mezzotint. C. Turner was a relation of J. M. W. Turner, our greatest landscape painter, and he assisted his eminent kinsman in the engraving of some of the plates of the "Liber Studiorum."

During the early part of the nineteenth century portraiture still maintained its supremacy, but the application of mezzotint to landscape art is characteristic of a later period. S. W. Reynolds, a pupil of J. R. Smith, was a very successful and skilled engraver. He engraved a series of 357 small mezzotints after the work of Sir Joshua Reynolds. These small plates form an illustrated index of Sir Joshua's work as far as S. W. Reynolds could find it. They are, however, not quite satisfactory, as the process of mezzotinting does not suit very small work any more than it suits very large work. S. W. Reynolds also engraved several plates after his own drawings.

William Say is noteworthy among the earlier nineteenth-century engravers, as he executed a small portrait of Queen Caroline in 1820 which is the first mezzotint engraved upon steel. Underneath the first proof made from this plate is a note: — "This attempt to engrave on steel was made in 1820. — W. Say." The portrait is not very pleasing, but many mezzotinters have worked in steel since with much success. No doubt the great durability of steel is much in its favor, but there are several technical difficulties connected with its actual use for engraving upon directly, and this has led to the modern evil of mezzotints engraved upon copper being covered with a thin film of steel, so as to give them a lengthened life. From such a steeled plate an infinite number of identical prints can be

drawn. From mezzotints engraved upon a copper plate about fifty prints of the finest quality can be drawn, after that the plate begins to deteriorate. The beauty of a print from a copper plate is a rare beauty; that of a print from a steeled plate never can be rare, neither is it equal in quality to a print made before the steeling operation was done. There are certain checks upon the indiscriminate production of prints from steeled plates, but I doubt if they are reliable.

J. M. W. Turner no doubt admired R. Earlom's etched mezzotints of Claude Lorrain's "Liber Veritatis," and it appears likely enough that this gave the former the idea of his "Liber Studiorum," issued in parts between 1807 and 1819. Turner made small sepia sketches, from which he etched the outlines on copper, and then had the light and shade filled in by various engravers in mezzotint or aquatint. Turner himself mezzotinted some of them. Of their kind they are the finest things that have been done, and they have always been favorites with collectors because of the difficulty of getting a complete set of proofs. Turner issued the prints in sets, "Prints" and "Proofs," but, as a fact, they were all mixed, so that to get a real set of proofs together involves a long search and much tribulation.

Quite recently Mr. Frank Short, best known as an etcher, produced a few etched and mezzotinted plates from sketches by Turner, done in the same manner as the old ones, to which they clearly approximate in every way.

T. G. Lupton was the first mezzotinter to work largely upon steel, and he chiefly engraved landscapes. For his success in working this process upon soft steel he received the medal of the Society of Arts in 1822. His work is, I think, the most pleasing of any mezzotinted landscapes; this is partly due to the fact that he used a brown ink by preference. Brown ink is troublesome to manage on steel. I think, altogether, that landscapes are hardly satisfactory in mezzotint, but that the finest effects are to be found among the splendid series of full-length portraits of ladies, after Sir Joshua Reynolds, or one or other of the artists of his period. Three-quarter lengths are perhaps the more usual form in portraiture, both in portraits of men as well as women, but there is a completeness about a full-length, which is necessarily wanting in a portrait representing any lesser degree.

David Lucas is particularly known for his interpretations in mezzotint after the landscapes of John Constable, R. A. They are, as a rule, too dark, and are printed in black ink. Sometimes pleasanter prints have been drawn from a worn plate than from a new one, as they are paler. At the same time the original pictures are dark, but I think that if Lucas had used a browner ink, as Lupton did, his landscapes would have been pleasanter. He nearly always engraved on steel. Lucas died in 1881.

Samuel Cousins brings us up to modern times; he gave up work in 1883. His work is always delightful. In 1814 he was apprenticed to S. W. Reynolds, and presently set up for himself at 104 Great Russell Street. He engraved largely both portrait and subject pieces, and his plates are very fully etched before the mezzotinting is put on them. His style may be considered as the modern one, as it has formed the key-note for most of his successors. A large plate, engraved by him, after Landseer, "Bolton Abbey," executed quickly and very effectively in etching and mezzotint, is supposed to have given the death-blow to the old-fashioned, slow and expensive process of line engraving. It was published in 1837. He engraved largely upon steel.

Mezzotints can now be very efficiently copied by means of photogravure, a form of etching, and probably this process may yet attain greater perfection. At present it leaves something to be desired in the matter of brilliancy, — there is too much loss of light. But a photogravured plate can be worked over to almost any desired extent by rocker or roulette, burnisher and scraper, so that it can be made almost identical with the original. A photogravure made direct from a painting is often very good, but here, again, it generally needs a little skilled handwork in weak places.

What with steel-plating of copper-plates, and the direct competition of photographic processes, it is probable that mezzotinting as a high art has had its day. Except for the work of a very few living engravers of the first rank in this method, mezzotinting has already reached its highest development, and we may well be proud of the beautiful examples which have been left to us by MacArdell, Valentine Green, J. R. Smith, and others of their period, men whose talent has been great enough to earn for their particular art of engraving the title of "La Manière Anglaise."

MODERN WAREHOUSES AND SHEDS IN THE FREE HANSA CITY OF HAMBURG.[1]

In the German Empire it is necessary, according to the regulations laid down in par. 16, and the following paragraphs, to obtain the permission of the authorities empowered by the laws of the nation: "For such buildings as by their local position or by the nature of the industries carried on in them, might cause important prejudice, danger or annoyance to the proprietors or inhabitants of the neighboring sites or to the public in general." It is, therefore, the duty of the authorities to prescribe in each case the measures necessary to secure safety from fire in the construction of the building and the working of the business.

But mercantile warehouses and stores do not fall under these regulations, although they contain great quantities of combustible goods, and also include some industries, except when the regulations from par. 16 *et seq.* are applicable to the latter, which, however, does not often happen.

In Hamburg, moreover, the Police Building Law now in force must be taken into consideration. This contains a number of regulations for fire protection, and, among other things, enjoins that the outside walls must be solid and the roofs fireproof; but it provides no definition whatever of the space permissible between the party-walls, nor any regulations concerning the nature of the interior construction of the stores.

Only for that district of Hamburg which has been handed over to the "Freihafen Lagerhaus Gesellschaft" established under State guaranty has it been laid down in a law, *ad hoc*, that special sanction is necessary both for the building and working of stores. To this company belongs a very important part of the store district in Hamburg, containing up to the present 114 stores, covering an area of about 62,000 square metres. For these buildings, then, the authorities prescribe regulations and conditions both for construction and working as occasion arises.

Besides this, on the quays at Hamburg a great number of store-sheds have been erected almost exclusively by the State of Hamburg for its own use. These store-sheds cover a total space of about 385,000 square metres.

The business carried on in these quay sheds requires that large modern ships (carrying up to 22,000 cubic metres of goods) may be unloaded and loaded again in the shortest possible time. This is done by iron cranes on the quay, 272 of which are worked by steam, 215 by electricity, 17 by hydraulic power and 139 small ones by hand.

The goods lying only a short time in these store-sheds, and being forwarded as soon as possible, must not therefore be piled up high. They must also be promptly sorted after unloading. Accordingly each shed must be on ground-level and have space to take comfortably the whole cargo of the largest steamers.

The newest sheds are about 200 metres long and 50 metres deep. They have no partition-walls. They are quite open to the quay in front and the rear wall is of wood; at the two ends are solid gable-walls which are carried above the roof.

Between the different sheds there is generally a space of about 30 metres; in a few cases where two sheds are built together, being separated by the gable-wall, any doors in this wall are fireproof.

In this kind of construction each shed, occupying a space of about 10,000 square metres, presents a single great risk.

The internal supports as well as the roof-construction are of wood, while the roof itself is made of "*pappe*" (paper). Considering the circumstances, these are altogether the best materials. For one cannot use for these sheds materials which would completely resist a really large fire; the roof would, therefore, in any case suffer with the rest of the building through the fire, and also a light wooden construction can more easily be cleared away and renewed than one of iron. Wooden construction has the further advantage that the cost of a renewal is not a great consideration; on the other hand, the interruption of business caused by work of long duration would cripple any part of the quay in which it might happen and entail great loss of money.

The modern stores in Hamburg are constructed quite differently from these sheds. To the former, of course, different principles and different conditions are applicable. The ground on which these stores stand is very valuable, and the goods generally remain in them a long time; they are therefore built with a number of stories.

The newest Hamburg stores of this kind are about 16 metres wide and 22 metres deep inside, and each has therefore, after deducting the staircases, an available floor-space of about 325 square metres in each story.

The outer walls are naturally of solid masonry, and the roof is fireproof, the gable-walls being carried 1½ metres above it.

The inside construction consists of iron supports protected by fireproof material and iron girders protected in the same manner. The ceiling between are made of "béton" with layers of iron (System "Koenen"). Above this lies a floor of wood.

Complete encasement with thoroughly fireproof material, for instance, hard-burned hollow bricks, as is often practised elsewhere, would naturally offer the greatest security against danger from fire, but it costs considerably more than that used at Hamburg, and with the good alarm system and organization of the Hamburg fire-brigade it must be taken for granted that the internal construction of these stores will resist a fire until the fire brigade has had time to extinguish it.

The floor in each of the stories has a slight fall towards the front and back in order to carry off the water that may have been used for extinguishing fire inside the stores, and by means of the outflow pipes fixed on the front prevent it from doing damage.

In these modern Hamburg stores each story has therefore its own separated risk, which is not at all a great one.

The staircases of these stores deserve special notice. For each store there are two stairs, the one at the front for general use and that at the back for use only in case of fire. In order that the back

[1] A paper by Chief Officer Westphalen, Fire-brigade, Hamburg, Ger., prepared for the International Fire Prevention Congress, held in London, Eng., July 6-11, 1903.

staircase should take up as little of the valuable floor-space as possible, each staircase is so arranged that it serves at the same time for two stores. Access to these staircases is obtained by an iron balcony on each story. The back staircase has a fireproof entrance in the cellar and leads up to the roof, where small iron stairs provide an escape in case of need over the parapet wall. This practical arrangement of the stairs allows of the greatest possible use of the floor-space for storage purposes and at the same time gives the fire-brigade the power of attacking the fire from two sides.

Most of the Hamburg stores serve only for storing goods, but some of them also contain working machinery. This cannot be avoided, as many business houses must manufacture their goods direct in the stores, but in such cases the plant is put in special compartments, which are separated by fireproof partitions from the stores. The unavoidable openings in the floors are also, as much as possible, protected by fireproof material, so that in such cases everything possible has been done to divide the whole building into as numerous, and therefore small, risks as possible.

If, on the one side, the Hamburg stores of the modern type may be considered "model buildings" from the standpoint of fire prevention, yet, on the other side, it must be pointed out that the fire organization of Hamburg has only been able to gain this success after many struggles. For a long time the building engineers offered insurmountable opposition. Perhaps they were anxious not to hide their intelligently designed and elegantly executed iron structures, but to maintain them in full view of all the world. The old myth was continually served up anew that the iron might suffer from rust behind the fireproof covering. Therefore this covering ought at least to be made removable. Such removable coverings are much too expensive and utterly impracticable for warehouse purposes.

When the fire organization, supported by the fire-insurance companies, energetically refused to maintain any more stores with unprotected iron construction, at first wood was again employed and supports and girders made of oak; but at last the fact that such a quantity of oak could not be obtained, or at least only at an impossible price, furthered the ends of the fire-brigade.

Since then the stores at Hamburg have been built according to the modern fireproof system.

Now we might suppose that the fire-insurance companies would allow a considerable reduction off the premium for goods which are stored in modern warehouses, but unhappily this is not the case. The fire-insurance companies have formed a ring, and are fixing the amount of the premium to suit their own views, and they take care that the high premium shall be maintained as long as possible. This is indeed greatly to be regretted. I think the fire-insurance companies, if they properly considered their own interests, ought, by reducing their premiums, no longer to refuse a practical recognition of the able and successful struggle of the fire-brigade for fire prevention, otherwise the State may yet carry out the idea of insuring such favorable risks as the Hamburg warehouses present.

BOOKS AND PAPERS

SIGNOR ALFREDO MELANI'S pocket-size manual "*Architettura Italiana antica e moderna*"[1] becomes more portly with each edition and the fourth edition, which has just reached us, is altogether too large for pocket transport or even for use as an agreeable travelling companion; but a welcoming place can be found for it on the book-shelves even of those who do not read Italian, for the illustrations and the indices of artists and monuments can be of service even to them.

ALTHOUGH the great majority of architectural books are affairs of but a single edition, there is nothing to be wondered at in the fact that so good, and especially so readable, a book as Mr. T. M. Clark's "*Building Superintendence*"[2] now appears in its fifteenth edition; but it is remarkable that the publishers should have waited until fourteen editions had been printed from the original plates before they could bring themselves to incur the cost of resetting the book. The first plates were cast from the type in which the articles were originally set for publication in this journal, type that is at least two sizes smaller than the type usually used for book printing and, as a consequence, the page never had anything but a starved and unattractive air, which must always have stood somewhat in the way of sales. In its new dress the book is certainly more attractive; but we cannot understand how the publishers could bring themselves to make use of the same old worn cuts that have done service in the earlier editions, the consequence being that lines are broken where they should be whole and voids are filled up where they should stand open. The combination makes a slovenly piece of book-making.

Besides revising and correcting the original chapters Mr. Clark has added an entirely new chapter on the steel construction of the modern high office-building.

[1] One of the series "*Manuali Hoepli*," published at Milan by Ulrico Hoepli. Price 7½ lire.

[2] "*Building Superintendence*": a Manual for Young Architects, Students and others interested in Building Operations as carried on at the present day. By T. M. Clark, Fellow of the American Institute of Architects. New edition revised and enlarged. New York: The Macmillan Co. London: Macmillan & Co., Ltd. 1903. Price $3 *net*.

EVERY one reads with interest and respect whatever Mr. Jacob Riis writes about poor people, their misfortunes and their needs, and he has been a good friend, not only to the poor, whose trials he shared for so many years, but to the rich, whom he has taught, more efficiently, perhaps, than any one else, how to help their less fortunate fellows, not alone by charity, but by the sympathy which never pauperizes, and which is quite as precious to most of the simple and warm hearted people of the slums as some of the hygienic reforms which they find it so difficult to understand, but which are not the less necessary for that reason.

We should not quite satisfy our conscience, in consideration of the importance of the work which many others beside Mr. Riis have at heart, if we did not say that, in the present book,[3] he seems to us to have injured his cause by unnecessary exaggeration, and by thoughtless assertions which, in many cases, are not only foreign to the subject, but are quite unjustified. For example, we are told, on page 20, that after warning had been given in France that to "kill the home" was to "destroy family, manhood, patriotism," the "warning was vain, and the home-loving Germans won easily over the people in whose language there is not even a word to describe what we express in the word 'home.'" This ancient slander has not grown any more respectable with age, and it would be difficult to conceive anything more contrary to the facts than the conclusions which Mr. Riis expects his readers to draw from it. Was there any lack, we should like to ask Mr. Riis, of manhood or patriotism on the part of the French during the Prussian War? If he has any information to indicate that the Germans "won easily" over the French in consequence of the lack of manhood or patriotism of the latter, historians, even German historians, would be glad to hear where he obtained it, the universal impression being that the German success was obtained by overwhelming military superiority, in preparation and organization, over as brave and devoted a people as ever stood before an invader. As to the absurd joke, for it is nothing better, about the French language having "not even a word to describe what we express in the word 'home,'" it may be of interest to quote a sentence from M. Georges Picot, President of the Société Française des Habitations à Bon Marché, who, in a recent speech, declared the object of the association to be the promotion of the "Respect et union de la famille groupée autour d'un foyer stable et attrayant."

If these words do not "describe what we express in the word 'home'" it would be a satisfaction to be informed of any better ones, in any language.

However, we may leave it to M. Mabilleau and M. Bourget to defend French homes, only remarking that, so far as our experience of them extends, if they have not the name, they at least have the substance; and that nothing, perhaps, would do more for the happiness of this country than the spread of the mutual affection between brothers and sisters, and the love of children for their parents, which is characteristic of the French.

In trying to defend the owners of tenement-houses against some of the epithets which Mr. Riis lavishes upon them we shall have, perhaps, a more difficult task, but it is worth undertaking, for the obvious reason that the wholesale denunciation of people who own tenements as "murderers," "robbers," and various other things, tends to defeat the object which Mr. Riis himself has in view, that of promoting the interest of one class in another, which is the source of all real and efficient charity. Mr. Riis, in describing the "piggeries" which the great majority of owners of tenements deprecate as much as he does, says that three, and even four, families often inhabit a single room. No doubt that is true, but is it the landlord's fault? We have yet to hear of a landlord who took rent from more than one family to a room, and the practice of poor people, particularly of the Russian and Polish Jews, of subletting portions of their rooms, not only profits the landlord nothing, but constitutes an abuse which he would rejoice to see broken up. Mr. Riis seems to think that the landlord ought to prevent it, but he does not tell us how he is to accomplish it. We know a man who owns five hundred tenements, aggregating, probably, more than three thousand rooms. How is he to know whether his tenants, as soon as his agent's back is turned, take lodgers? Moreover, it is questionable whether he could control them, perhaps not in this respect, but in other similar ones, even if he tried. We had once a tenant, a much richer man than his landlord, who insisted on keeping a calf in the cellar of his house. There was nothing in his lease to prevent him from doing so, and he only yielded to our expostulation out of friendly feeling. For dealing with such cases as this, as well as for the prevention of overcrowding, the public authority is the proper means. Anything else must be inefficient and unreliable, and inefficient and unreliable regulation is worse than none. If every tenant subletting a portion of a room could, on being reported by the police, be fined a trifling sum, the practice would soon disappear, and most landlords would be glad to coöperate in the work, so far as they could.

The same may be said of the criminal use of tenements. Mr. Riis tells us that "the most terrible of all the features of tenement-house life in New York, however, is the indiscriminate herding of all kinds of people in close contact; the fact that, mingled with the drunken, the dissolute, the improvident, the diseased, dwell the great

[3] "*The Peril and the Preservation of the Home.*" Being the William L. Bull Lectures for the Year 1903. By Jacob A. Riis. Philadelphia: George W. Jacobs & Co.

mass of the respectable workingmen of the city with their families."

No doubt this is true, but the answer is, where are the police? Are drunkenness and dissoluteness licensed in New York? If they are, nothing can save family life there, and if they are not, why are not the legal means for the protection of family life applied?

To a great extent, the question is one simply of police, and the sentimental treatment of it, which finds expression in vague yearnings, and rantings, and denunciations of landlords and builders, does enormous harm, in turning public attention away from the corruption and dishonesty of the officials whose duty it is to defend the homes of citizens. We may be sure that no one chuckles louder over oratorical assaults upon landlords, who encourage the "murder of the home" through the character of some of their tenants, than the police captain who wrings money, stained with tears of shame, from the miserable women as the price of his "protection." Thanks to Mr. De Forest, Mr. Riis himself and many others, New York has now a good tenement-house law; but fresh air and light can do little to help the family life of their occupants, so long as criminals are allowed to live in them; and the repression of criminality in them is exclusively the duty of the police. When this work is properly performed, the friends of the poor will have a comparatively light task before them; but until it is performed, they are working against fate.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

A COMPETITIVE DESIGN FOR THE IMPROVEMENTS AT THE U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.: QUADRUPLE PLATE.

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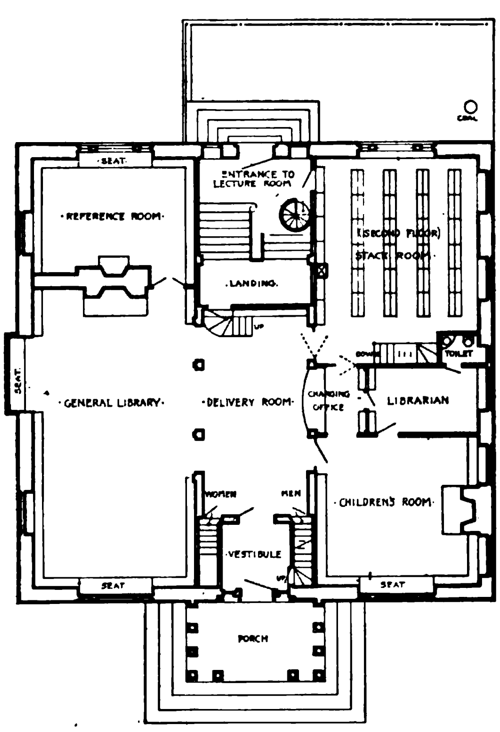

ENTRANCE PORTICO TO SAME.

REAR VIEW OF SAME.

VIEW IN DELIVERY-ROOM OF THE SAME.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A QUESTION OF COMMISSION.

READING, PA., August 3, 1903.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you state what an architect's proper remuneration is under the following circumstances: — A client has plans and specifications prepared for a building and bids received on the same. The lowest bid is $45,000. At this stage the work is abandoned, not because the price is too high, but on other considerations altogether.

Very truly yours, "READER."

[THE usual charge in such cases is seven-tenths of the total fee. — EDS. AMERICAN ARCHITECT.]

NOTES & CLIPPINGS

OLD TIN CANS. — I was much surprised and greatly interested a few days since, when shown through a certain establishment near New York City, to find that the "raw material" used consisted chiefly of empty fruit and vegetable cans rescued by the cartload from the dumps of the city. I had supposed, up to that time, that the only purposes for which such material was suited were food for goats or to be attached to the tails of unfortunate canines. The principal products of this establishment, which is a foundry, are window sash-weights, elevator-weights and ballast for boats. The weight castings are very hard, and when struck with a hammer ring like steel. About the only tool which can be used for removing sprues and fins is the hammer, as a cold chisel or file will not stand up to the work. The fracture of the round sash-weights is smooth and shows crystals radiating from the centre like spokes of a wheel. After delivery at the foundry the cans are first piled onto a large iron grating, located under a sheet-iron hood which terminates in a smokestack. They are sprinkled liberally with crude-oil, which is set on fire. This process consumes the labels, loosens the dirt and melts the solder, which falls through the grating, is collected, washed and melted, cast into ingots, and sold to be used again. Some of the cans which are simply lapped and soldered melt apart completely. These are sorted out and the sheets forming the shell are straightened and bound into bundles to be sold to trunk-makers, who utilize them for protecting the corners of Saratoga trunks. They are also bought by button manufacturers, who stamp from them the disks used in cloth-covered buttons. The remainder of the cans, being machine-made, do not come apart. These are loaded into large carts, taken to the charging floor on an elevator and dumped into the cupola. The cupola is fed with coke and cans in alternation. There is occasionally an old wash-boiler or a bundle of tin roofing used, but cans form the bulk of the material. The cans are so light that some of them are carried out at the top of the stack by the force of the blast, and a large screen has been arranged to prevent the pieces from falling on the roof. If among those readers of *The American Machinist* to whom these facts are new there are any who have occasion to use the elevators in the skyscrapers of New York, I can imagine such wondering how many empty cans it took to make the weights which balance the car in which they ride. — *The American Machinist.*

IMPROVING FRENCH CANALS AND HARBORS. — A scheme of no small magnitude, involving an expenditure of more than $50,000,000, has just been adopted by the French Senate. It relates to the improvement of a number of French ports and the construction or enlargement of canals in connection with them. The sum of nearly $6,000,000 is to be spent in improving the navigability of the Garonne, the Orleans Canal and a series of waterways in the north and south of France. New canals are to be constructed at a cost of $30,000,000. They include the Canal du Nord, destined to cut off a bend of the Oise and supplement the Saint Quentin and Ourcq Canals, the Loire Canal and other water-courses intended to link Combleux to Orleans, and Cette and Marseilles with the Rhone. The remainder of the credit will be devoted to improving the harbor accommodation at Dunkirk, where it is proposed to spend $5,000,000, and at Boulogne, Dieppe, Havre, Rouen, Saint Nazaire, Nantes — where the expenditure will be between $4,000,000 and $5,000,000 — Bordeaux, Bayonne and Cette. In his statement the Minister of Public Works said he did not expect that a loan would be needed, and hoped that the works would be completed in seven or eight years. All these works are considered necessary in order to meet the growing competition of the Italian ports with the southern littoral of France, especially in view of the opening of the Simplon tunnel, and also to promote the development of the northern coal-fields. A similar bill, passed through the Chamber of Deputies by the Waldeck-Rousseau Ministry two years ago, contemplated a much larger expenditure but failed to become law. It is expected that the present measure will be more fortunate, as the need for many of the improvements is known to be urgent. — *N. Y. Evening Post.*

SHEET-ZINC ROOFING. — Sheet-zinc owes its value for roofing purposes to its durability, lightness and economy as compared to galvanized-iron, tin-plate, copper, lead, slate and tile. Galvanized-iron being

coated with zinc should possess theoretically as much durability as sheet-zinc and less weight for the same strength, together with less first cost, but as a matter of fact the union of the zinc and iron effected in the ordinary process of galvanizing is not sufficiently strong to withstand long the expansion of the two metals, wherefore the zinc coating gradually scales off, exposing the iron, and thus creates an electric couple, which results in the more rapid corrosion of the iron and destruction of the roof, although that may be delayed somewhat by a frequent and thorough painting. With the greatest care, however, fifteen years is a long life for a roof of galvanized-iron. The superiority of sheet-zinc over galvanized-iron was shown in the case of the Northwestern Railroad Station in Birmingham, England, which was roofed in 1853 with the latter and carefully painted on both sides every three years and repaired whenever necessary, but at the end of twelve years was found to be so rotten that it had to be removed; it was replaced by a sheet-zinc roof which still exists in perfect condition and has given but little trouble or expense for repairs. The coating of basic zinc carbonate which forms on the surface of a zinc roof is practically insoluble in atmospheric water and thoroughly protects the underlying metal from further oxidation by atmospheric agents. — *W. R. Ingalls.*

Terminating a Contract. — That one who considers a contract terminated should not allow the other party to proceed with its performance is shown by the decision of the Second Appellate Division in the case of the H. Krantz Manufacturing Company against the Gould Storage Battery. The action before the court was one to recover for the manufacture of an electric switch. Additional work was done on the switch and from time to time it was modified. The contract was in the form of correspondence, supplemented by verbal instructions. The defense was that the contract had been cancelled and the work abandoned. This alleged cancellation was brought about, the defendant averred, by a telephone message. The plaintiff denied sending the message, and the subsequent conduct of the defendant, said the Appellate Court, by Justice Woodward, did not confirm the truth of his contention. There was a conference between representatives of both parties to the suit nearly two months after the alleged message of cancellation, at which the progress of the work was discussed. There was also produced a letter sent by the plaintiff to the defendant plainly indicating that the former was still at work on the switch and expected soon to deliver it. Justice Woodward said, in part: "Aside from the inconsistency suggested by the reading of the defendant's evidence of cancellation in the light of this subsequent conduct of the parties — an inconsistency which renders the defendant's testimony on the point extremely improbable — the plaintiff's evidence of the defendant's acquiescence in the continuance of the work on the switch, subsequent to the date of the alleged cancellation, is sufficient to warrant the plaintiff in invoking the rule that one cannot stand by in silence when he knows that another is acting upon an erroneous state of facts and thereafter claim the benefit of the correct state of affairs, if such claim will tend to the injury of the other person." — *N. Y. Times.*

Purification by Rain. — The health department has often called the attention of the public to the fact that rain is a great purifier, and there is some highly interesting testimony to the same effect in a recent number of the London *Lancet*, which is fortified by references to a recent examination and analysis. Beginning with June 13 London had a continuous rainfall for five days, the total precipitation being estimated at 3.8 inches. On the third day of the period a supply of raindrops was secured for an investigation, and it was found that the solid matters contained therein amounted to 9.1 grains per gallon. Among the constituents noted were common salt, ammonium sulphate, organic ammonia, soot and suspended matters and nitrates. The *Lancet* assures us that the quantity of ammonia sulphate, .652 grain, was remarkable, and that its chief origin is the combustion of coal. Salt contributed .8 grain and soot and suspended matter 5 grains. With this analysis and an estimate of 6,437,229,860 gallons for the total rainfall over the London County area as the basis of the calculation, it is figured that the enormous downpour "represents the washing out of no less than 3,738 tons of solid impurities, of which 330 tons consisted of common salt, 267 tons of sulphate of ammonia, and 2,000 tons of soot and suspended matters." Another interesting computation is given as follows: "Regarding the combustion of one ton of coal to produce twenty pounds of ammonium sulphate (a very fair average) the quantity of coal represented by the storm would be 29,904 tons." The *Lancet* adds that besides the purification which is shown by the analysis there is a bacteriological purification also, which of course is a very important factor in the beneficent work of the rain. — *Chicago Record-Herald.*

Pig-iron Statistics. — The American Iron and Steel Association has received from the manufacturers complete statistics of the productions of all kinds of pig-iron in the United States in the first half of 1903, also complete statistics of the stocks of pig-iron which were on hand and for sale on June 30, 1903. Total production of pig-iron in the first half of 1903 was 9,707,367 gross tons, against 8,808,574 tons in the first half of 1902 and 9,012,733 tons in the second half of 1902. The production of Bessemer pig-iron in the first half of 1903 was 5,480,619 gross tons, against 5,105,932 tons in the first half of 1902 and 5,287,236 tons in the second half of 1902. The production of basic pig-iron in the first half of 1903 was 1,203,803 gross tons, against 1,053,274 tons in the first half of 1902, and 985,316 tons in the second half of 1902. The production of charcoal pig-iron in the first half of 1903 was 232,717 gross tons, against 186,098 tons in the first half of 1902, and 192,406 tons in the second half of 1902. The stocks which were unsold in the hands of manufacturers or their agents on June 30, 1903, amounted to 126,301 tons, against 49,951 tons on December 31, 1902, and 30,861 tons on June 30, 1902. — *Bulletin of American Iron and Steel Association.*

London's Breathing-places. — London is said to possess at present no less than 313 parks and open spaces, while in 1884 their number was only 103. They are reckoned to have cost $10,995,000. On a rough calculation there is an acre to 752 persons. — *Exchange.*

A Just and Honest Union. — The International Longshoremen, Marine and Transportworkers' Union has long had the reputation of being the one labor organization in the United States that respected its obligations and treated its contracts as inviolable. When individual members of the union have broken faith with employers and refused to carry out their agreements, the officers of the union have often hired non-union men to do the work. It is not surprising to find that the vessel-owners of the Great Lakes are not only willing but glad to deal with the union. They know that an agreement once signed means what it says, and that while the union will seek the utmost advantages, when the contract is once made it will be carried out to the last, least letter. Secretary Barter, in his Annual Report to the National Convention at Bay City, described the union's Code of Ethics in these words: "We have demonstrated that our members can be trusted and depended upon to carry out agreements which they may enter into from time to time. We have shown that through their organization they are capable of managing large contracts, which necessitate skilful direction in order to give the dispatch that is necessary in these times of sharp competition. By living up to all contracts in both letter and spirit this Association has reached the point of its present success, and success in the future depends upon the furtherance of these principles. Each year it is easier to approach those who employ the services of members of this Association, and by strict compliance with our agreements we enlarge our most valuable asset — integrity. They are willing to meet us, treat with us, and comply more readily with our requests for better conditions, knowing that any contract to which are affixed the signatures of the officers of this Association will be carried out." This report is worth the consideration of all labor organizations. It spells the secret of a great success, and, incidentally, the recommendation that sympathetic strikes be abolished marks another advance in the direction of sanity. When all trades-unions emulate the longshoremen by holding their contracts sacred, by discouraging sympathetic strikes and encouraging the use of labor-saving machinery, there will be few serious conflicts between the employer and employed. Organizations of employers will stop trying to raise millions of dollars to fight the unions. The unions will have become as responsible as the employer, and this responsibility will make for peace in the industrial world. When the unions learn that their moral responsibility is commensurate with their power, there will be more organizations like that of the longshoremen and fewer of the other kind. — *Detroit Free Press.*

Straw in Egyptian Brick. — The ancient Egyptians had a process for making bricks which rendered them very hard, yet easy to work. An American engineer, Mr. Acheson, thinks he has discovered their secret. The Egyptians used straw, and by boiling straw in water and mixing clay with it he found that it gave hard, shapely bricks that did not crack or deform in baking. Analysis proved the effect due to tannin dissolved in water. Further experiments showed that from one-half to one per cent of the tannin of commerce added to the resistance of the brick. The process also economizes water, and such bricks dried in the sun are even more solid than those of the kiln. — *London Globe.*

Copper-plated Plaster Casts. — One of the latest outgrowths of the wonderful art of electro-plating is the use of the "galvano-electrical method" in taxidermy in making casts of fishes, reptiles, birds and animals. The Smithsonian taxidermists were among the first to adopt this new method. It has been the experience in sending about plaster and papier-maché casts of animals to various expositions that they are subject to much damage in packing and shipping. Instead of fragile objects of this kind, therefore, persons who visit the St. Louis Exposition will see animals of hollow copper and brass, so life-like, however, that many will think that the real thing is before them. — *American Inventor.*

Architects and the Lien Law. — Architects are to be protected by the mechanics' lien law, so the Supreme Court of Rhode Island decided July 9 in the suit of Field & Slocum, architects, *vs.* the Consolidated Mineral Water Company. The Court says: "The statute is intended to afford a liberal remedy to all who have contributed labor or material toward adding to the value of the property to which the lien attaches. The plans of the architect are written directions to the workmen and contribute to the building as much as the verbal directions of the overseers." — *Exchange.*

The River gives as it took away. — Some University students making a geological survey along the Kaw River a few miles west of Lawrence discovered an old stone house which had been uncovered by the flood on the farm of Henry Collins. The house had been completely covered, a field of corn being above it, but its walls and the chimney are in a fair state of preservation. Within the house, which has been partially excavated, was found an iron stove, showing that it had been the abode of civilized people. — *Lawrence (Kan.) Gazette.*

The Georgia Marble Belt. — As a marble-producing State Georgia may rival Vermont. The marble belt is about sixty miles in length, extending in a southwesterly direction from the North Carolina line through Pickens County. The supply is practically inexhaustible, as the depth of the deposit in many places is over 100 feet. Both white and colored varieties are found. — *Exchange.*

S. J. Parkhill & Co., Printers, Boston, U. S. A.

No. 43. *No. 43.*

"Topical Architecture"

PUBLISHED JULY 15,

is devoted to

"Gates and Railings"--VIII.

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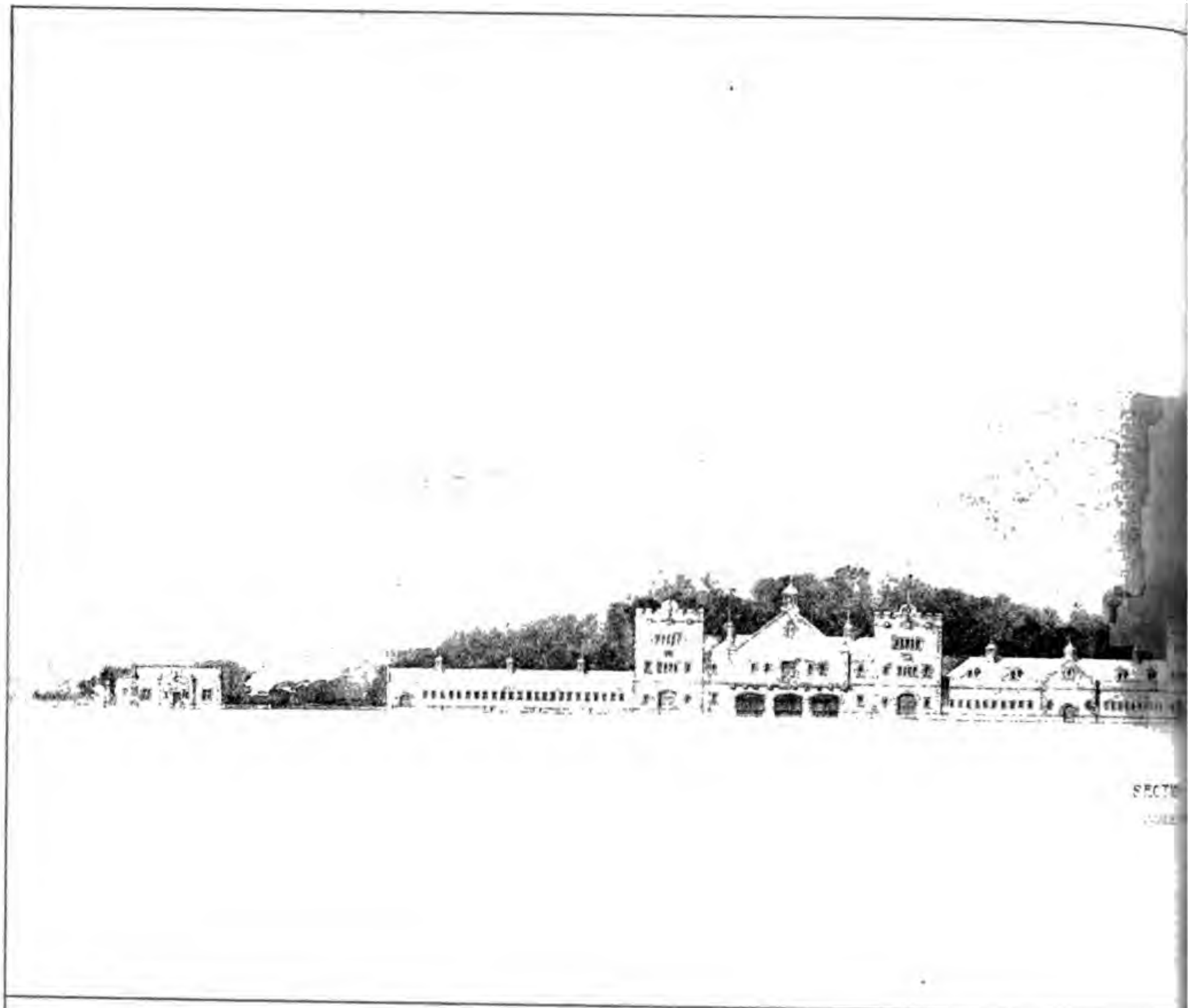

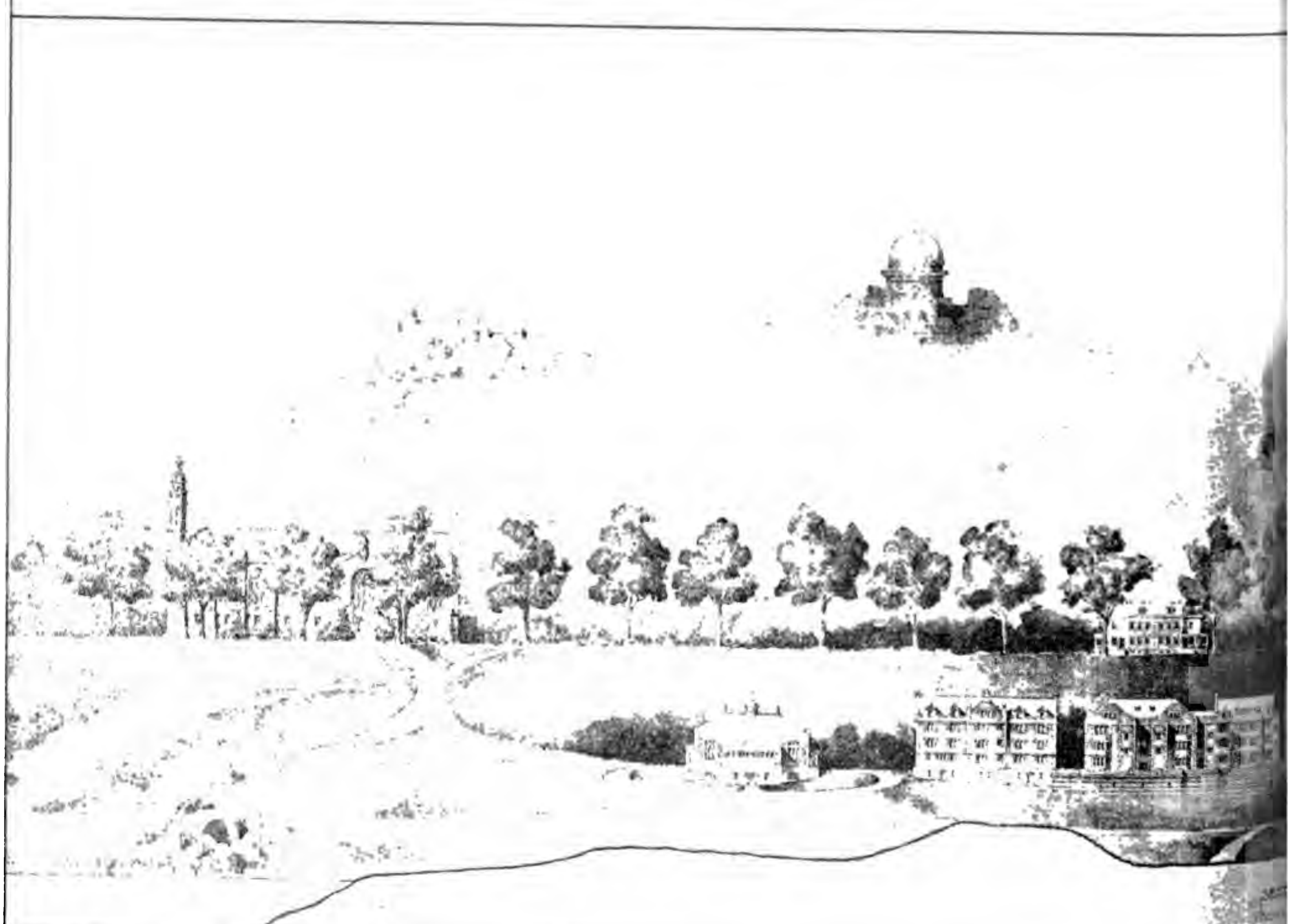

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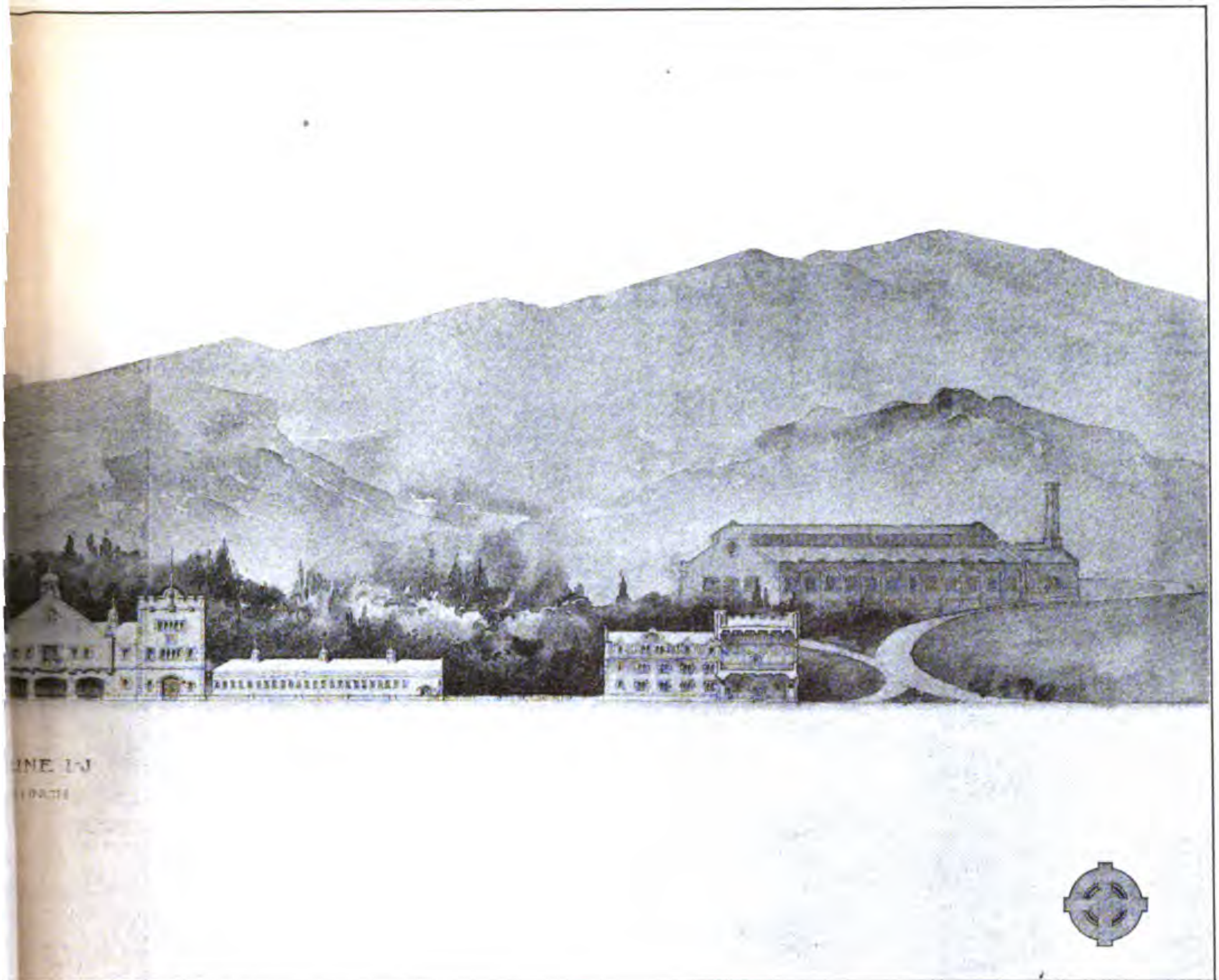

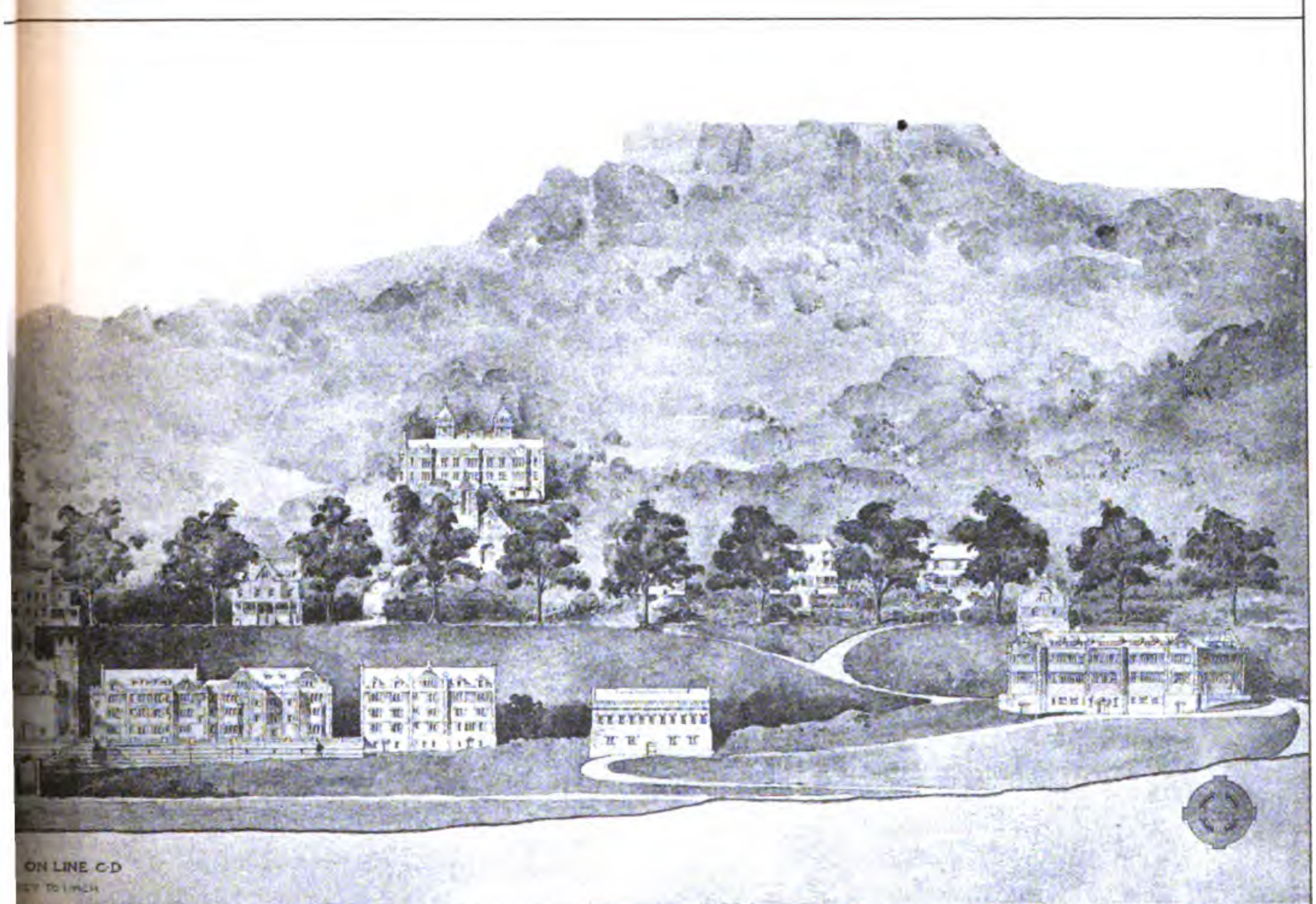

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ARCHITECTS.

The American Architect
Aug. 22, 1903.
No. 1443.

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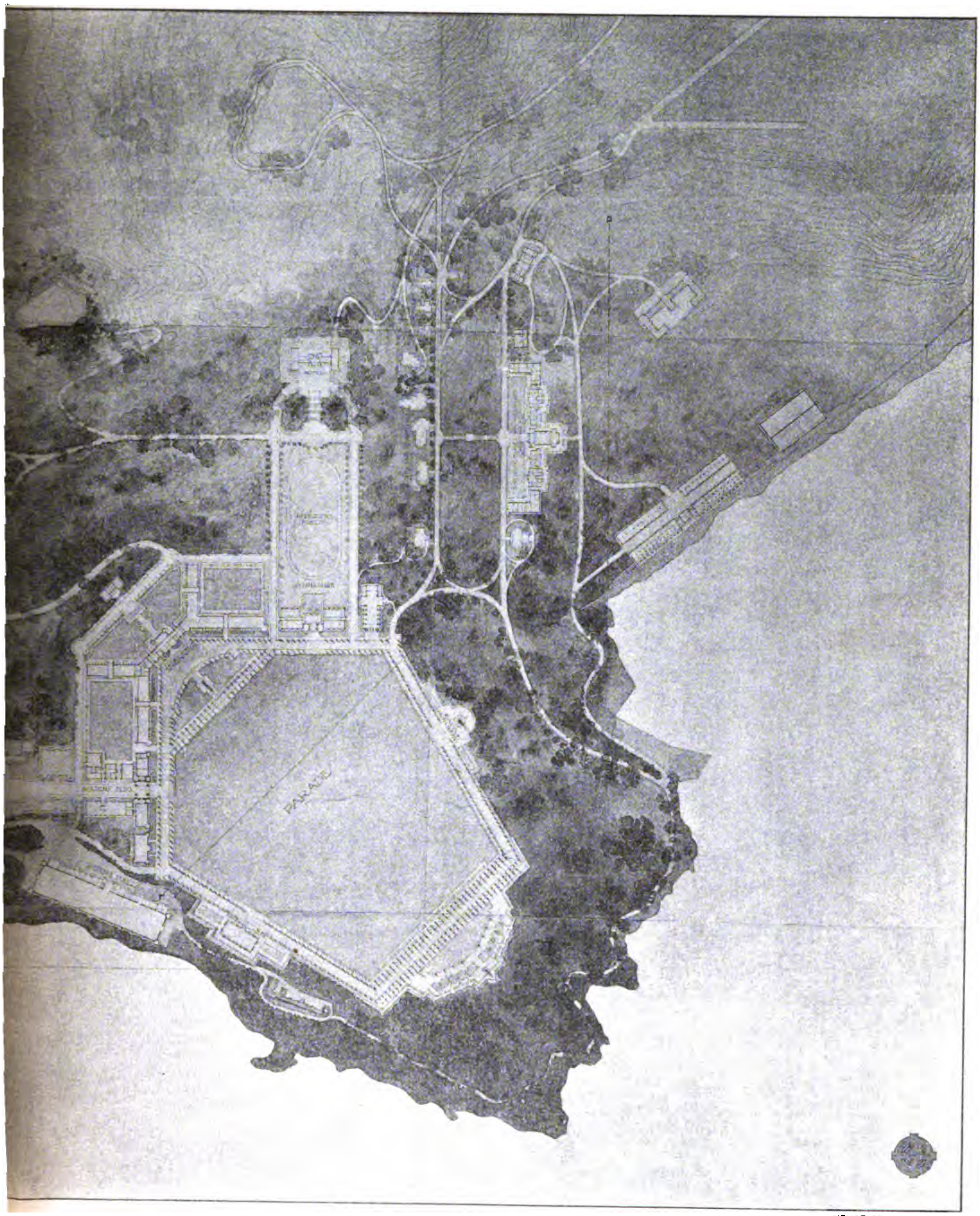

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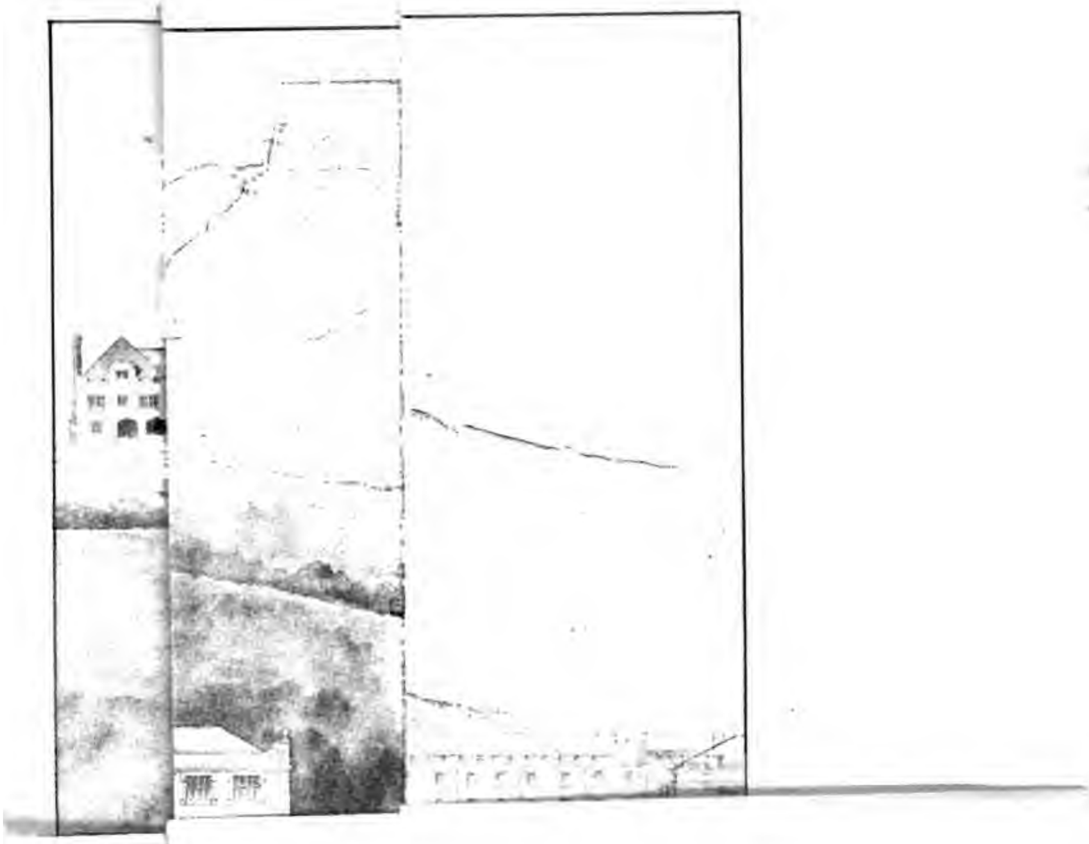

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THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI SATURDAY, AUGUST 22, 1903 No. 1443

CONTENTS.

BOSTON is having, on a small scale, a repetition of the New York struggle over the tenement-house laws. As the building regulations of the city now stand, all tenement-houses more than three stories in height must be of first-class, that is, fireproof, construction throughout. The consequence of this provision has undoubtedly been to check the construction of tenement-houses within the building limits, and to transfer it to Brookline, Dorchester and other places just outside the limits, where the laws are less strict, and where immense numbers of non-fireproof tenement and apartment houses have been put up within the last few years. To our mind, this has been a disadvantage to the suburban places, and an advantage to the city, but every one is not of that opinion, and a determined attempt is being made to secure the relaxation of the ordinances relating to the city proper. In aid of this attempt the familiar arguments are brought forward. We are told that "the laws are so strict that where land values are high, as in the crowded tenement districts, it does not pay to tear down old buildings in order to put up new ones"; and we are expected to infer that, if the law were "softened up," the "old rookeries" would be pulled down, and "clean, sanitary dwellings" erected in their places. A singular observation is made to support this view, that, according to the city fire-officials, "more than half the fires in the tenement-house areas are purposely started." We should say that this disclosure of the propensity of the occupants of tenement-houses to arson was conclusive evidence that the present law should not be relaxed, particularly as all the older part of Boston is composed of the most dangerous mixture of wooden and brick buildings, which nothing can preserve from conflagrations except an increasing admixture of structures really fireproof.

IT is a mistake to suppose that the conditions in the Boston tenement-house district do not admit of fireproof construction. As all architects know, the additional cost of such construction over that with wooden beams need not exceed fifteen per cent, with structural steel at normal prices, and the saving in repairs pays a large interest on this extra outlay, to say nothing of the fact that better tenants, at higher rents, can be obtained for such buildings. We should be as much pleased as any one to see the North End and West End "rookeries" swept away, but to sweep them away, and replace them by the ordinary Brookline and Dorchester tenements would be a very questionable advantage. In fact, the old wooden "rookeries," although they are not attractive in appearance, often have better light and ventilation than the modern brick tenements; and, unless the latter can afford greater security against fire, there is not much reason for desiring a change, even so far as their occupants are concerned, and none at all in the interest of the community at large.

THE city of Birmingham, Alabama, proposes to adopt a code of building regulations, and to choose an inspector to see that they are carried out. The newspapers give only meager details of the proposed regulations, but they seem to be strict enough. As in New York, every building must be erected under the supervision of an architect, and the minimum thickness of brick walls is to be thirteen inches. We think that it is a mistake to require thirteen-inch walls for small and low buildings. There are hundreds, perhaps thousands, of houses in the Eastern cities in which eight or nine inch walls, four stories high, have stood for half a century in good condition; and an eight-inch wall, eight stories high, is said to be still standing in Chicago. If eight-inch walls will carry four stories safely for fifty years, it is a hardship to poor people to compel them to build thirteen-inch walls for their modest two-story dwellings. Not only is a considerable sum added to the cost of their houses, but a very appreciable deduction is made from the space inside of them, without advantage to any one. It is generally understood that the insurance companies are the chief advocates of regulations increasing the thickness of brick walls. So far as party-walls are concerned, the probability that wooden floor beams might meet in the middle of an eight-inch wall is a sufficient reason for requiring a greater thickness; but outside walls are not exposed to this danger, and, as builders will agree, a good eight-inch wall, which can be bonded through its whole thickness with headers, is, proportionally, much stronger than a twelve or thirteen-inch wall.

THE Boston *Advertiser* has something to say about steel-frame buildings, which is not very new, but in the course of which it mentions the fact that "iron structural work" has recently been found at Herculaneum, in such good condition, after being buried in the ground for more than eighteen hundred years, that "it is now being employed in a modern Italian building." It is hardly conceivable that pieces of antique structural iron, the only ones, if we are not mistaken, ever found, except the fragments of lattice girders in one of the Roman baths, should be allowed by the vigilant Italian officials to be appropriated by local builders; but supposing the story to be true, search should at once be made for other specimens, in order that they may be analyzed for the benefit of science. It is now known that Herculaneum, instead of being overwhelmed by a flow of lava, as is commonly supposed, was buried in fine ashes of the same sort as those which covered Pompeii; but at Herculaneum the shower of ashes was accompanied by heavy rain, which packed the dust and cinders into a mass which has now become almost a solid rock. It is known that the eruption which destroyed Herculaneum was accompanied, like other volcanic eruptions, with the disengagement of vast quantities of sulphurous acid gas, which would, presumably, have been absorbed by the rain, and carried down into the mass of ashes. Any iron buried in these ashes would, then, be exposed for many months, until the moisture had completely dried out of the mass, to the action of watery vapor combined with sulphurous acid. This would very rapidly destroy any modern iron or steel, and a metal capable of resisting its action deserves to be carefully studied. Some small pieces of iron have been found at Pompeii, under dry ashes, still recognizable, although corroded; but we are told that these fragments from Herculaneum were, when found, "in as good condition as when first used." Possibly the iron may not have been in actual contact with the moist and acid mass; and it may be that the solidifying of the coating above it prevented circulation of air, and in this way kept off corrosion; but, in any case, the matter is of great practical importance.

THE great contest in the building trades in New York is, we hope, substantially over. Notwithstanding the threats of the walking-delegates of the Parks order to "tie up" all building, by ordering strikes of such unions as they still control, the great majority of the unions of building workmen have accepted, in substance, the agreement offered by the Employers' Association, and building has been actively resumed. Meanwhile, workingmen, as well as others, are likely to make silent note of the contrast, in regard to the benefits secured for their constituents, between Mr. Parks and his kind, who have kept their men poor, through continual strikes, while they filled their own pockets, and curried favor with politicians by the display of their power, and the late Peter M. Arthur, of the Brotherhood of Locomotive Engineers, who,

although he hated publicity, and kept himself as much out of it as possible, was able to keep the members of a powerful labor organization constantly employed, at good wages, and under satisfactory conditions, at the same time that he was honored and trusted by the employers. In fact, Mr. Arthur may be considered to have been the best exponent that the industrial world has yet seen of the principle that the interests of employers and of those whom they employ are substantially identical; and that the man who works for his employer faithfully, skilfully and intelligently is the one to whom his employer can afford to pay the highest wages and extend the most favors. Naturally, the demagogues who live by cultivating the notion that employers and employed are natural enemies, and who found in Mr. Arthur's successful management a standing refutation of their doctrines, hated him bitterly, and he was continually denounced by the radical labor journals; but the locomotive engineers, whose interests he had defended, and whose conduct he had guided, for nearly thirty years, with equal wisdom and integrity, did not need to ask what other people thought of him; and his example will, we may hope, be as influential after his death as it was in his lifetime.

MR. ARTHUR S. CUTLER, city architect of Lowell, was drowned at Strafford, New Hampshire, a few days ago. His family had been spending the summer at Strafford, and he was amusing himself by rowing on the lake, when, as is supposed, he was seized with faintness, or with some affection of the heart, and fell overboard. He was an expert swimmer, and could hardly have failed to make his way to the shore if he had been conscious at the time of the accident.

MR. AUGUSTUS F. LASH, a person very well known to Boston architects and builders, died a day or two ago, at the age of eighty-two. Mr. Lash was the first man in Boston to undertake on a large scale the removal of old buildings. This has now become an important industry, employing many hands, but it was a novel business sixty years ago, and Mr. Lash and his partner long enjoyed a practical monopoly of it. During his business career he is said to have removed more than three thousand buildings, among which were many of historical interest, such as the Wendell Phillips house on Essex Street, the Stackpole house on Devonshire Street, the Commercial Coffee House on Washington Street, and "Marm Dunlap's Store," on Theatre Alley, now a part of Devonshire Street.

MR. HENRY ALLEN DARROW, one of the pioneer architects of Omaha, Nebraska, died there a week ago. Mr. Darrow settled in Omaha in 1877, when the city was little more than a frontier settlement, and designed many of the principal structures which its growth has rendered necessary.

A BELGIAN inventor proposes to protect buildings against fire by an ingenious application of wireless telegraphy. The buildings to be protected are fitted with wireless transmitters, which are put in operation by the expansion of the mercury column in a thermometer-tube. Each transmitter includes a notched wheel, which produces a special signal, peculiar to the building or room in which the transmitter is placed. In the nearest fire-department station, or some other suitable place, is a receiving instrument, which not only gives the alarm when the automatic signal is received, but records the exact location of the fire. Whether the apparatus has been tried in actual service we do not know. The signals used in wireless telegraphy are of such a character that it would be difficult, we should think, to produce them automatically with such apparatus as would be available in an ordinary fire-protection service; and the noises and obstructions of a city would not make the task any easier; while, even if they could be transmitted with certainty to the receiver, with the necessary clearness, it seems as if confusion might arise if two or more alarms happened to be given at the same time. We have no wish to disparage what is, at least, an ingenious invention; but architects cannot experiment with ingenious inventions, at the expense of their clients, unless they have positive proof that the devices have already been tried with success, under average conditions. The expense of the wire connections for city fire-protection is not very large, at least in this country, and there is not enough gained by leaving out the wire to make it worth while to sacrifice efficient and certain operation.

THE people who imagine Khartoum to be a collection of tents, among which dervishes gallop on their swift dromedaries or Arab steeds, spearing all persons who refuse to acknowledge the Prophet, will, perhaps, be surprised to learn that the "blocks and streets" of the town are already occupied by structures of "plain and massive," as well as elegant, architecture. The buildings of Gordon College are nearly completed, as are those of the War Office, the Courts of Justice, and the Post-office. Two banks, the Bank of Egypt and the National Bank, are in full operation; there are two fine clubs, the Soldiers' Club, for military men, and the Soudan Club, for civilians, and fine warehouses are going up on all sides. Considering how few years have elapsed since the black hordes of the False Prophet overwhelmed the city and the garrison, the citizens must, we should say, take a considerable interest in the movements of the tribes by whom they are surrounded. Undoubtedly, in the end English enterprise and perseverance will overcome the hostile power of the natives, just as our Indians, who, it will be remembered, interfered seriously with the building of the Union Pacific Railroad, have, in less than a generation, sunk from dreaded warriors to anthropological curiosities; but the civilization of the Soudan is not likely to be completed without some checks.

FROM the other side of the Continent comes a tale with plenty of moral to it, if one is inclined to seek such a thing in every amusing story, and, fortunately, it is not needful to mention name of person or of locality. It seems that, recently, a certain California town was notified that Mr. Carnegie had consented to make it one of the beneficiaries under his benevolent system of increasing the educational opportunities of his adopted country, whereat there was at once public rejoicing and a special rubbing of hands on the part of the library trustees. Their exultation was, however, quickly chilled by receiving from a certain architect a long communication in which he claimed that it was due solely to his unaided personal efforts that this happy result had been achieved, and that consequently he wished the trustees to understand that he considered that he had valid claim upon them for appointment, at the usual full commission, as architect to the proposed new building; and he further generously offered to work over without charge a certain design prepared by him for the library so as to adapt it to the new selected site and fit it to Mr. Carnegie's gift. In support of his claim he narrated how, finding, in 1902, that the town had no library, he "took the trouble to locate one or two of the Library Trustees" — entire strangers to him — and suggested that they should approach Mr. Carnegie, but was told that an unavailing attempt had already been made. The architect, however, felt sure that should he prepare a new design and submit it to Mr. Carnegie the prayer would be granted and the town secure its library, and he would prepare such design if it were to be understood that he should be appointed architect to the building at the usual commission. This proposition he now maintains was accepted, and he argues that as Mr. Carnegie had experienced a change of heart it must be because of his efforts, and he consequently calls upon the trustees to make good the promise he received. In support of his contention he offers, further proof, which on the face of things seems likely to be of questionable worth, for among other things he declares that the design proposed by him "is, or should be, still in your [their] possession," while it seems to us his claim would have been stronger if he could have declared that it was in Mr. Carnegie's possession or had even been seen by that gentleman. The trustees rejoin by saying that in some degree the tale is true, but that in one all-essential particular the claimant is at fault, for they point out that the gentleman named by the architect as having closed the bargain with him was not capable of binding them, since, although now one of the trustees, he was not at that particular time a member of the Board, but was simply one of a certain private committee which at that time was endeavoring to secure, by public subscription, enough money to build the library without Mr. Carnegie's help. Apparently the architect has drawn hasty conclusions from insufficient premises and must content himself with being one of the architects invited by a properly empowered board of trustees to submit a design in competition with other architects. The most obvious moral to be drawn from this is that when one sets out to "locate" a trustee he should do it with the same scrupulous care he would practise when visiting a land-office. Hares are not the only thing that a hungry man — anxious for a dinner or for a job — should take particular care in catching.

DEATH BY WATER-GAS.[1]

ILLUMINATING gas has suffocated three hundred and ninety-six people in Massachusetts during twelve years.

The death-roll has increased much faster than the production of gas during this period.

In 1889, 3,173,000,000 cubic feet of gas were made, and there was only one death by suffocation in the State.

For 1899 the volume of gas was 4,939,000,000 feet, and sixty-nine persons lost their lives through its use. This shows an increase of 55 per cent in the manufacture of gas, and a multiplication of the deaths by sixty-nine. In other words, the rate of increase in mortality was one hundred and thirty-four times that for gas production, between these two years.

In contrast with one death and 3,173,000,000 feet of gas in 1889, a life was lost for every 554,000,000 feet made in 1890, when six people were suffocated. Gas ended the lives of fourteen persons during 1891, or one for every 235,000,000 feet of gas produced. In 1892, 221,000,000 feet of gas were made for each of the sixteen deaths from its use. Seventeen lives were a part of the price paid for gas in 1893, or one for each 209,000,000 feet. It required only 143,000,000 feet of gas to bring about the death of each of the twenty-five persons that perished in 1894. Thirty-eight people were suffocated during 1895, or one to correspond with every 101,000,000 feet of gas made. The entire population, save twenty-nine, escaped death by gas in 1896, the mortality being one to every 153,000,000 feet of gas. In 1897 gas extinguished the light of life in sixty bodies, and the ratio was one death to every 78,000,000 feet. Only 68,000,000 feet of gas were necessary in 1898 to compass the death of each of its seventy-two victims. Sixty-nine people were suffocated during 1899, making the ratio one to each 74,000,000 feet of gas. In 1900 the public escaped with a loss of only forty-nine members and 100,000,000 feet of gas were required to end a life.

Forty-three times as much gas was made per person suffocated in 1889 as in 1899. This points to a radical change in the quality of gas and a great increase of its deadly properties.

Two sorts of gas are made from coal for general distribution. Coal-gas is a product of soft or gas coal when heated in retorts or benches. Water-gas is made by the admission of steam to incandescent anthracite coal or coke. Both gases are enriched by the addition of oil-gas, made from gas-oil or petroleum. The most important difference between coal and water gas as to their effects when breathed into the lungs is due to the proportions of carbonic oxide which they contain. In coal-gas carbonic oxide forms from 5 to 10 per cent of the total volume. Water-gas contains 20 to 30 per cent of carbonic oxide by volume. Carbonic oxide owes its deadly properties to some effect on the blood of a person breathing it, rather than to the mere exclusion of a suitable amount of oxygen from the lungs. It has been shown in laboratory tests that a very small percentage of carbonic oxide in the air of a closed apartment is fatal to animal life. Either coal or water gas will cause death when mixed with the air in sufficient proportions, but a much smaller percentage of water than of coal gas will lead to fatal results. For these reasons the general use of water-gas for purposes of illumination is much more dangerous than like use of coal-gas.

Prior to 1889 the amount of water-gas made in Massachusetts was comparatively trifling, and in that year it formed only 2.3 per cent of the total of coal and water gas. From this time forward the percentage of water-gas and the deaths by suffocation went up together. In 1890, when there were six deaths, the percentage of water-gas was 6.3. With fourteen deaths in 1891 water-gas stood at 23 per cent. Water-gas reached 34 per cent in 1892, when sixteen people were suffocated. Seventeen people lost their lives during 1893, when the percentage of water-gas was 41. In 1894 66 per cent of water-gas was accompanied by twenty-five deaths. Water-gas rose to 62 per cent in 1895, and the mortality by gas was thirty-eight. While twenty-nine lives were lost in 1896 the percentage of water-gas was put at 64. Thus far the number of annual deaths by gas lagged behind the percentage of water-gas to the sum of water and coal gas.

It was to be expected, however, that suffocations by gas would multiply faster with the higher percentages of water-gas, and this is just what happened. With water-gas at 65 per cent in 1897, the number of suffocations rose to sixty. In 1898 the percentage of water-gas was 64, and there were seventy-two victims. For 1899 water-gas stood at 63 per cent and there were sixty-nine deaths. In 1900 the percentage of water-gas dropped to 58, and the number of victims to forty-nine. In view of these figures it may be said approximately that one life is lost annually for every one per cent of increase by water-gas in the total of water and coal gas.

Thirty-two plants continue to distribute pure coal-gas and twenty-six plants sell either water-gas or a mixture of water and coal gas. From 1889 to 1900 inclusive there were only ten deaths by suffocation with gas in all of the places where pure coal-gas was distributed. During the same period three hundred and eighty-six persons were suffocated where either water-gas or a mixture of coal and water gas was in use. In 1889 the plants selling pure coal-gas made 89 per cent of the total production of coal and water gas, and there was no death by suffocation where the pure coal-gas was used. For the same year there was one death from water-gas. Water and mixed gas were only 18 per cent of the entire output in 1890, but five lives were lost where they were employed. Pure coal-gas on the other hand, with 82 per cent of the total volume made, resulted in only a single death. For 1891 the product of pure coal-gas stood at 67 per cent of the total gas made and destroyed a single life. The percentage for water and mixed gases in this year was only 33, but thirteen persons lost their lives where these gases were distributed. In 1892 not a life was lost by pure coal-gas, though it formed 40 per cent of the entire product in Massachusetts. Mixed coal and water gas, representing 60 per cent of the volume made, suffocated sixteen persons during the year last named. Water-gas alone and mixed with coal-gas was 59 per cent of the entire amount made in the State during 1893, and it killed sixteen people. Pure coal-gas made up the other 41 per cent of the product, and only one life was lost by its use. In 1894 pure coal-gas killed two people, and water-gas and mixed water and coal gas killed twenty-three people. As to the total volume made the percentage of pure coal-gas was 27 and that of water and mixed gases 73 for the same year. Pure coal-gas ended only one life during 1895, while water and mixed gases killed thirty-seven persons throughout the State. For this year the output of coal-gas alone was 22 per cent and that of water and mixed gases 78 per cent of the total volume. The output of plants making only pure coal-gas was only 18 per cent of the entire volumes of gas for the State in both 1896 and 1897, and it caused no death in either year. Water and mixed gases in these years, with 82 per cent of the total volumes, suffocated twenty-nine and sixty persons.

During the years of 1898, 1899 and 1900, pure coal-gas remained at 19 per cent of the volumes of all gas in the State, and in these years one, two and one person, respectively, were killed by its use. In the three years just named, water and mixed gases, with 81 per cent of the annual volume of gas, ended the lives of seventy-one, sixty-seven and forty-eight people, respectively.

From these facts it is clear that the dangers incident to the use of pure coal-gas have not materially increased. On the other hand the lengthening list of deaths with water and mixed gases is out of all proportion to their volume compared with pure coal-gas.

Of the thirty-two plants now distributing pure coal-gas, only nine have contributed to death by suffocation. Two deaths have been caused by gas from one of these plants, the other eight are charged with only one death each, from 1889 to 1900. In Cambridge, where 294,000,000 feet of coal-gas were made in 1900, there has not been a death by suffocation with gas during the twelve years under consideration. The plant at Salem made 63,000,000, that at Taunton 55,000,000, that at North Adams 48,000,000 and that at Brockton 45,000,000 feet of pure coal-gas during 1900, and no death has been caused by gas from these plants from 1889 to the latter year. Plants at Newton and East Boston, that made 108,000,000 and 58,000,000 feet of pure coal-gas, respectively, during 1900, have supplied the gas for only one death each in twelve years.

These examples show that cities large enough to offer shelter for the very ignorant and dissipated classes are practically free from deaths by suffocation, where pure coal-gas is used.

Twenty-nine plants were distributing either water-gas or mixed water and coal gas in 1900. Gas from each of twenty of these plants caused death by suffocation in the period included by 1889 and 1900. Only one large plant, that at Lawrence, distributed water or mixed gas during these twelve years without fatal results. In the Lawrence plant the product has been mixed gas since 1890, and the highest percentage of water-gas during the period was 37 in 1900.

The total product of the Lawrence plant reached 146,000,000 feet in 1900. Next to that at Lawrence, the largest plant that has distributed mixed or water gas without fatal results is located at Spencer, where 6,600,000 feet of water-gas formed the entire output for 1900.

At Athol water-gas alone has been made during the twelve years, and three persons have been suffocated. In 1900 the product of the Athol plant was 5,300,000 feet. Mixed water and coal gas has been distributed in Worcester since 1888. Deaths by suffocation began in that city in 1890, and have continued in six subsequent years, reaching a total of sixteen for the period. In 1900 the product of mixed gas was 274,000,000 feet. The highest ratio of water-gas to the annual output was 56 per cent in 1899; in 1898 and 1899, when the percentages of water-gas were the greatest, there were eight deaths by suffocation in Worcester.

In Fall River mixed gas was made up to 1891, and water-gas alone thereafter. Gas has caused the death of six persons in this city, and five of these have been due to water-gas alone. In 1900 the production of gas at Fall River was 178,000,000 feet.

Prior to 1891, the plant at Pittsfield made only coal-gas, but mixed gas began to be distributed in that year. Since 1896 water-gas alone has been the product of this plant. Four lives have been lost by gas in Pittsfield, and three of these deaths have occurred since the manufacture of coal-gas was discontinued. The gas output for 1900 was 20,000,000 feet in that city.

Pure coal-gas was made in Haverhill prior to 1892. Beginning with that date mixed gas has been distributed in four years, and water-gas alone in five. This city has been the scene of seven suffocations by gas, all of which have occurred since water-gas was introduced. For 1900 the product of gas at Haverhill was 121,000,000 feet. Both water and coal gas have been made at Lynn during the twelve years from 1889 to 1900, except in 1893, when coal-gas alone was the product. During this period the city has had six deaths with gas. The largest percentage of water-gas in the total product at Lynn for any year was 43. In 1900 the gas output of this plant was 198,000,000 feet.

[1] The facts herein stated are mainly drawn from the annual reports of the Gas and Electric Light Commissioners.

Prior to 1891 there was no gas-plant at Framingham, but water-gas was introduced in that year. Gas from this plant has killed three people. Only water-gas has been made at the Framingham plant, and the output for 1900 was 8,700,000 feet. Amesbury and Chicopee each have plants that make only water-gas, and one death by suffocation has occurred in each place since water-gas began to be distributed. The plant for water-gas at Amesbury has operated during the period from 1889 to 1900. Prior to 1892 the plant at Chicopee made coal-gas, but in that year water-gas was introduced, and the manufacture of coal-gas was discontinued thereafter. In 1900 the output of gas at Amesbury was 7,000,000 and at Chicopee 17,000,000 feet.

Only coal-gas was made in Holyoke prior to 1897, and there were no deaths by gas. In that year water-gas began to be mixed with the coal-gas and one death has been the result. The largest percentage of water-gas in the mixture at Holyoke for any year was 32. During 1900 the Holyoke plant produced 80,000,000 feet of mixed gas. Springfield had a supply of pure coal-gas up to 1896, when water-gas began to be made there. Since this date the supply has been mixed gas, the greatest annual percentage of water-gas being 29. No deaths by gas are recorded for Springfield before the introduction of water-gas, but since that event there have been two victims. Gas to the amount of 162,000,000 feet was made by the Springfield plant in 1900.

The manufacture of water-gas began at Malden in 1897, and mixed water and coal gas has since been distributed. From 1889 to 1897, when the product was pure coal-gas, there were no fatal results, but since the later year gas from this plant has suffocated one person. The percentage of water-gas in the product of the Malden plant reached 36 in only one year. In 1900, the product was 98,000,000 feet of gas.

Equipment for the manufacture of water-gas was added to that for coal-gas at New Bedford in 1892, and mixed gas has since been distributed during each year except 1893, when only coal-gas was made. There were no fatal results from the use of gas at New Bedford before 1892 or in 1894, but since the later date three people have been suffocated by mixed gas. In only one year the ratio of water-gas in the total output at New Bedford has reached 42 per cent. For 1900 the production of gas in this city was 57,000,000 feet. Lowell has had more gas victims than any other city in the State except Boston, and all the deaths have occurred since the introduction of water-gas in 1893. Prior to that year, pure coal-gas was distributed in Lowell with no fatal results. Since 1893 mixed gas has been supplied. Death by suffocation began at Lowell in 1895, when the percentage of water-gas was pushed up to 46. Four deaths occurred in 1897, four in 1898 and four in 1900, when the volumes of water-gas were 39, 42 and 50 per cent of the respective mixtures. Intervening years supplied five other victims of gas, making the total seventeen. The plant at Lowell supplied 371,000,000 feet of mixed gas during 1900.

Boston has a long lead in the total list of gas fatalities, though not a single suffocation with gas occurred in the city during 1889, when coal-gas formed 99 per cent of the total volume made by its plants. Seven companies distributed gas within the corporate limits of Boston during the entire period from 1889 to 1900 inclusive. Two of these companies, the East Boston and Jamaica Plain, have made only coal-gas and are confined in their distribution to certain portions of the city, where there is no other supply of gas. Only one death by gas has occurred in the territory of the East Boston plant and none whatever in the territory of the plant at Jamaica Plain, during the entire period of twelve years. The other five gas-plants have constantly supplied the remaining parts of the city, including the town of Brookline. The territories of these plants overlap to some extent, and water and coal gas have been distributed therein in varying proportions. It is convenient here to consider these five gas-plants and their territory under the general title of Boston. Using Boston in this sense, its production of gas in 1889, when no one was suffocated there, amounted to 1,735,000,000 feet. In 1899, when gas found fifty-eight victims within the Boston limits, the volume of gas made there was 2,502,000,000 feet, or only 44 per cent greater than the amount for 1889. Boston has been the scene of most of the deaths by gas within the State, because the greater part of all the water-gas made has been distributed within its limits. In 1890, Boston made 70 per cent of the water-gas produced in Massachusetts, and had 60 per cent of all the gas victims. For 1891 the per cent of water-gas went up to 82 and for suffocations by gas to 69 for Boston. In 1892 the city claimed 80 and 81 per cent respectively, of the water-gas and the deaths by gas. Water-gas remained at 80 per cent and the number of gas victims rose to 87 per cent for Boston in 1893. Boston still made 80 per cent of all water-gas and claimed 91 per cent of the loss of life by gas in 1894. The State at large now began to gain in the production of water-gas, and in the incident mortality, for the per cent of the former dropped to 78, and of the latter to 89 in Boston during 1895. In 1896, Boston had 79 and 89 per cent respectively, of all water-gas and the deaths due to its use. For 1897, the like figures were 77 and 86 per cent. The lead of Boston was reduced to 75 per cent in water-gas and 73 per cent in the number of suffocations during 1898. The like figures in 1899 were as to water-gas 73, and as to fatalities 86, per cent. In 1900, owing to a reduction of the volume of water-gas made in Boston, the city had only 67 per cent of the product and 70 per cent of the deaths by gas.

When water-gas formed only one per cent of the volume made in Boston, in 1889, there was not a single suffocation there. Water-gas went up to 8 per cent of the product in the city during 1890 and there were two deaths from its use. For 1891, the percentage of water-gas was 37, and Boston was the scene of nine gas fatalities. Another rise brought water gas to 52 per cent of all gas made in the city, in 1892, when thirteen persons were suffocated. Of the sum of coal and water gas made in Boston during 1893, the water gas formed 67 per cent and fourteen lives were lost through its use. The next year saw water-gas rise to 88 per cent of the mixture, and twenty-one unfortunates were added to the list of its victims at Boston. Thirty-three people were suffocated in the city during 1895, when water-gas was 96 per cent of all the gas manufactured there. In 1896 water-gas fell back to 91 per cent of the mixture in Boston, and the lives of only twenty-six people were sacrificed by this means of illumination. Four parts of coal-gas and 96 per cent of water-gas went to make up the supply at Boston in 1897, and the lives of fifty-two persons paid the penalty of its use. The following year saw the per cent of water-gas and the number of suffocations at the figures last stated. In 1899 the percentage of water-gas in the product at Boston was again 96, and the mixture found fifty-eight victims. During 1900 23 per cent of coal-gas and 77 of water-gas made up the Boston output, and, as might have been expected, the number of deaths by gas fell back to thirty-four.

During 1889, 1,735,000,000 feet of gas, 99 per cent pure coal-gas, was manufactured in Boston and not a life was lost by its use. In 1899, with a product that contained only 4 per cent of coal-gas, every 43,000,000 feet found its victim.

For the period included by 1889 and 1900, the production of water gas throughout the State amounted to 23,462,000,000 feet. Of this amount the seven companies already considered under the heading of Boston, namely the Bay State, Boston, Brookline, Roxbury, Dorchester, South Boston and Charlestown companies, made 17,949,000,000 feet, or 76 per cent. In the territory supplied by these seven companies there were 315 deaths by suffocation with gas during the twelve years, or 79 per cent of the 396 deaths in the entire State. The percentage of deaths at Boston thus nearly equals the ratio of the water-gas made there to the total product of water-gas in Massachusetts for the twelve years.

All of these facts point to the conclusion that the distribution of water gas, pure or mixed, is far more dangerous to human life than like use of pure coal-gas, and that the danger increases rapidly with the proportion of water gas in the mixture. The comparative dangers of pure coal-gas with water or mixed gas are illustrated by ten deaths where the coal-gas and 386 where water-gas or mixed gas has been supplied. A rising number of suffocations has borne witness to the fatal quality of water and mixed gases in almost every city where they have been supplied. The experience of smaller places has been repeated on a grander scale and with more terrible results in Boston. In the light of facts, it is unnecessary to invent any peculiar excuse for the occurrence of 268 deaths by gas in the limits of older Boston, that is exclusive of Roxbury, Dorchester, South and East Boston and Charlestown. This older section of the city is the site of most of the cheap hotels and lodgings, and here the population is most dense. No doubt similar sections in the centres of Lowell, Worcester and other cities would prove on investigation to be the sites of the larger numbers of suffocations. There is no reason to assume that the people of Boston have less regard for life, exercise a smaller degree of care, or are more drunken than their neighbors. Gas claims most of its victims in Boston because more water-gas is present there to do the deadly work. So true is this, that Boston's percentages in the total death list and in the State's volume of water-gas are almost identical.

While the poorer and less educated classes have suffered most by gas suffocation, because of the inferior construction and crowded condition of the buildings they inhabit, neither wealth nor intelligence affords security from the dangers of water-gas. Many examples might be given but two or three must suffice.

On May 15, 1890, the wife and daughter of President G. Stanley Hall, of Clark University, lost their lives by suffocation with mixed water and coal gas, at Worcester. On April 12, 1897, Dr. William A. Gibson was found suffocated by gas in his room on Columbus Avenue, Boston, though one window was partly open. On March 2, 1900, Norman G. Baker was suffocated with gas in a room at the Parker House, Boston. In neither of these instances was there any indication of suicidal intent. Examination of the reports of suffocation by gas shows that of the 396 deaths, 116 were probably cases of suicide. There is strong presumption, however, that the suicidal intent would not have been carried out in most of these cases had pure coal-gas been the agent used for the purpose. These presumptive suicides number only 29 per cent of the total deaths.

In addition to the persons who have perished, hundreds of others have been found in an insensible condition that would shortly have ended in death, but for the timely arrival of aid. Death by suffocation with water-gas on a grand scale in Massachusetts is a result of Chapter 252, of the Acts of 1890. The Legislature by this Act removed the restrictions on the sale of water-gas and left private interest to determine the distribution of this deadly substance. Before 1890, the sale of gas containing more than 10 per cent of carbonic oxide was prohibited by section fourteen of Chapter sixty-one of the Public Statutes. The act of 1890 was promoted by those interested in the manufacture of water-gas and was the result of some years of agitation.

Chapter 428 of the Acts of 1888, authorized the gas commissioners to license the sale of water-gas, but required them to specify the percentage of carbonic oxide that gas might contain in each case, and to certify that it could be used with safety. Seven companies applied for licenses under the Act of 1888, but the Commissioners refused to grant any of them because of the dangers incident to the use of water-gas. The Commissioners pointed out in subsequent reports that the distribution of water-gas carries with it much greater danger than that of coal-gas.

In the Legislature of 1890 other forces were more potent on the question of water-gas than the facts presented by the Commissioners or the remonstrance of those who feared its deadly properties. The result was complete license for the sale of water-gas.

Experience has now demonstrated the relative advantages of coal and water gas. Starting at the works, it appears that the cost of coal-gas is materially less than that of water-gas, for equal outputs. Consumers have not benefited by the introduction of water-gas, for the range of prices is lowest in places where only pure coal-gas is sold. The general difference of two or three candle-power between coal and water gas is too slight to be of much importance.

FIREPROOFED WOOD AS A BUILDING MATERIAL.[1]

IN the construction of large buildings, the question of fireproofing has at last assumed its proper position at the head of all other questions concerning the manner of construction.

As representatives of this twentieth century, we congratulate ourselves upon our advanced civilization, and our industrial and scientific development, but it is a lamentable fact that numerous problems of vital importance to the life and happiness of our race are still unsolved through stupid neglect.

Two of these problems are fireproof construction and sanitary regulation of disease. There is little cause for complacency over these subjects when contrasting the world's condition to-day with that of two or three centuries ago.

Fortunately we are at last waking to the gravity of the situation, and material advancement has been made in the past decade. It has taken us 2,000 years to learn that great conflagrations are the result of human neglect and ignorance, rather than visitations of Divine wrath. The same is true of widespread plagues and distributed malignant diseases.

We have made marvellous progress during the past few hundred years in the method and magnitude of our building operations. The introduction of iron and steel into this class of construction marked an era in architectural history. With their advent came the use of the term "fireproof construction." It was fancied that steel beams, iron columns and tile or concrete floors would make a building indestructible. Alas! we know to our sorrow that the term "fireproof" is often a delusion. Buildings, as generally constructed during the past twenty-five years, were no barrier to fires, and, as a matter of fact, not so safe as if built of solid wooden beams. These would at least be slow-burning, and not wreck the whole building by the buckling of columns and beams as soon as heated.

Our cities are filled with magnificent structures, marvellously constructed, but a very small percentage of them are at all fireproof. It is absolutely true that our great cities to-day are but little less inflammable than they were in 1666, when this city was swept by fire from Tower to the Temple, with results sufficiently awful to make a period in history. Similar conflagrations have occurred with painful frequency all over the world since that time, and now, after a lapse of 250 years, are still of yearly occurrence. Were it not for the high efficiency attained by the noble body of men, the firemen, in all our cities, consequences of fire would be far more appalling than they are. This is particularly true in America, where the craze for high buildings has made the fireman's work doubly hazardous.

The time has come when all permanent construction should be strictly incombustible. That the public has awakened to this fact is evidenced by this gathering of representative men from all parts of the world to discuss the various methods of solving the problem.

The necessity of *fire prevention* is beginning to be appreciated. Energy and money are freely spent in exploiting all kinds of fireproof construction. Fortunately the public has lost its credulity, and no longer accepts the statement that a system of construction is fireproof unless it is *proved* to be such by practical test. Your chairman is one of the pioneers in this class of experimental testing. His splendid work during the past few years by sifting the meritorious processes from numerous trashy ones, has aided greatly in classifying the many proposed methods of fire protection.

In the United States during the past few years, much investigation of this character has been done by the New York City authorities, also by the National Board of Underwriters at their testing laboratory in Chicago, and by the Insurance Engineering Experiment Station in Boston. All are doing excellent work. I am informed that much similar work is being accomplished by experts in various Continental cities. I regret that I have been unable to secure records of their work.

If this class of investigation receives the support it deserves, the results will be invaluable, and reduce to a minimum the fire-hazard of large buildings. Among the various materials for reducing fire-risk is the so-called "fireproof wood." It is upon this subject your executive has kindly requested me to address you to-day.

First of all, let us have a clear understanding of what is meant by the term "fireproof wood." For the information of those unfamiliar with the subject, it should be stated that the term "fireproof wood" is a misnomer; for all such woods will burn if exposed for a sufficient time to a high degree of heat. Strictly speaking the processes of treatment do not make the woods *fireproof*, but simply render them fire retardants. Fire-resistant wood is a much more logical term. The public has been somewhat deceived by the representatives of certain processes who make the silly claim that woods treated by their methods are rendered absolutely incombustible. Such statements are foolish, for they lead to expectations of resistance which cannot be achieved. When the deception is discovered it causes unjust criticism and mistrust of the whole product.

The term "fireproof wood" is a trade name, and should not be taken in a strictly technical sense.

New York City is probably now using more fire-resisting wood than any city in the world. This results from two causes: first, the Building Law, which requires that such treated wood shall be used throughout all buildings over twelve stories (or 150 feet in height); and secondly, to the fact that the city proper is too limited in area to spread, and enormously high buildings have become necessary. Scores of buildings erected during the past two or three years are over fifteen stories high, and many of them twenty-five and thirty.

It has been my privilege, under the direction of the Bureau of Buildings, to test most of the wood which has been used in these buildings. For the year ending the first of this month, I have tested and reported upon upwards of 3,500,000 feet. The greatest part of this material was for floors which were laid on the top of strictly fireproof floor construction of concrete or the hollow tile. The balance of the material was used for trim. An evidence of the magnitude of building construction now going on in that city is the recent filing of plans with the Bureau of Buildings for one structure in which 2,000,000 feet of fireproofed wood will be required.

I would here add that there are at present three companies supplying this treated wood to the city of New York. There are other companies established for the same purpose in Philadelphia.

The impregnation of wood with chemicals to render it fire-resistant is by no means a new idea. Numerous experiments with various chemicals were made as early as 1825 by Fuchs, Gay-Lussac, Boucherie, and later by Löchtin and other Continental chemists. However, it is within the last few years only that the business has been put upon a practical commercial basis.

It is conceded, by most experts who have carefully studied the subject, that the fireproofing of wood is a safeguard and, under ordinary conditions, will greatly reduce the fire-risk. It will, however, be consumed by continued application of flame, and under certain conditions especially favorable to fire, may support a slow combustion by itself, but the same conditions of heat would also ruin many other accepted fireproof materials. To my mind, the non-inflammable nature of the material is its greatest value.

When a fire occurs in a room trimmed with ordinary wood, its inflammability makes it immediately dangerous. The flames leap from one point to another, dashing through windows and transoms, thus spreading the fire to adjoining rooms. If the wood is finished with oil or varnish, the flames will run along it with marvellous speed. If finished with well treated wood this tendency of spreading the flames is reduced to a minimum; even if the burning material in the room is sufficient to ignite the treated wood, it burns so slowly that life and property are much less menaced. It would at the worst be a distinctly slow-burning conflagration. That in itself is a great safeguard, because it allows time for the arrival of the firemen.

Numerous inorganic materials are being exploited to replace wood entirely in fireproof construction. If it were possible to find a substitute for wood, which possessed its merits and none of its failings, it would be most desirable. So far, I have never seen anything which had the lightness, strength, durability, cheapness, ease of working, and last, but not least, the elements of beauty for decorative purposes which wood possesses. For these reasons it will surely long remain a favorite with architects.

Granting the value of fire-resistant wood as a structural material, the next problem is to determine what degree of fireproofness should be exacted, and how the standard of quality can be maintained.

Not being acquainted with the methods employed on this side to accomplish these objects, I will confine my remarks to our practice in New York.

In the early stages of experimentation it was customary to build a small house of the wood to be tested, usually duplicated by a house of untreated wood; then applying a vigorous fire both inside and out, and noting results. This method possesses spectacular elements which are very convincing, and while it may be useful as a general test to demonstrate the degree of immunity from fire that a wooden building may be made to possess, the heavy expenditure of time and money required for such a test precludes the possibility of employing it for regular series work. This is the only value such a demonstration possesses, for the results of fire-tests made upon wood treated a year or so ago may bear no relation to the product of the same company to-day. It is essential for public safety that regular serial tests should be made upon all material delivered for use, as is the custom in the manufacture of steel, cement and other structural materials.

Unfortunately there is no recognized test for fireproofed wood. In

[1] A paper by Professor Woolson, Columbia University, New York, N. Y., prepared for the International Fire Prevention Congress, held in London, Eng., July 6-11, 1903.

America a variety of tests have been proposed by different investigators, most of them being the direct application of heat or flame to small test-specimens, and noting the duration of flame and glow produced, as well as the amount of wood consumed. One method recently proposed makes the amount and character of gas given off from dry distillation of small fragments of wood a basis of classification, but no uniform method has yet been adopted.

An effort was made a year ago by the Building Bureau of New York City, in conjunction with the various fireproof-wood manufacturing companies, to decide upon some standard method of test. But the project was abandoned. The present method of testing is as follows:—

When a shipment of lumber is prepared, an inspector proceeds to the works, and selects at random one sample from every 2,000 feet of material. This is sent to the laboratory and tested; reports being sent to the Building Bureau and the manufacturer. Two tests are applied to each sample. One a "shaving test," which is a test used by the United States Navy, and the other a test devised by the writer, which for want of a better name is called a "timber test."

The shaving test, while useful in a general way to determine the flaming properties of treated wood, is, nevertheless, unsatisfactory. We are now making series of different tests in an endeavor to supplant it with something more reliable. The test is conducted as follows: a pan 1 foot in diameter and 6 inches deep is mounted on legs. The bottom is formed by a heavy wire screen of ½-inch mesh. This wire bottom is covered with a layer of shavings 2 inches deep, and a Bunsen burner is applied underneath for twenty-five seconds; then the burner is removed, and the lengths of time during which the shavings support (1) flame and (2) glow are recorded, and also the area of shavings burned.

The idea of this test is that shavings from properly-treated wood will not support flame any considerable time, and that the flame will gradually die out without material enlargement of the burned area. After test, the remaining shavings are thrown away. There are no means for making a permanent exhibit of the results, except by photographs, which would be difficult to take and quite unsatisfactory. The wood must be accepted or rejected on the judgment of the operator, based upon notes taken while observing the test.

Besides these obvious disadvantages, there are two other strong objections to the shavings test: first, the extreme difficulty of always maintaining the same conditions of flame and heat under the shavings; and second, the impossibility of securing a uniform quality of shavings for tests. The Navy specifications call for the use of the Bunsen burner with a flame giving about 500° Centigrade = 932° Fahrenheit. Now, Bunsen burners vary considerably in the size of flame they produce, so, although every precaution was taken and the same standard temperatures were determined in each of two flames at some definite point, the results of tests upon the same kind of shavings might show widely different figures, because of the general variation in the character of the flames. Much depends also upon how and where the tests are conducted; whether under a smoke-hood with a strong draught, or in an open room where air-currents could strike the flame and cause it to sway. The most serious objection, however, to the shavings test, and the one which, in the writer's opinion, is fatal to its use as a standard method of comparison, is the impossibility of making the shavings of uniform size and quality. The samples here exhibited demonstrate the objection made.

These shavings were all made by the same carpenter and were as nearly alike as possible for him to make them. You will note that some are fine like sawdust, while others are very coarse, with all graduations of size between. Another objection is that in coarse-grained wood like oak, the plane, in making the shaving, splits many of the large pores and allows the crystallized chemical to fall out, thus removing a part of the fire-resisting agent. Lastly, no wood in the form of shavings would be exposed to fire in a building. It would seem that further evidence is unnecessary to demonstrate the inappropriateness of this test alone as a standard of comparison.

To avoid the difficulties of this and similar tests, the previously mentioned "timber test" was designed. Though not entirely satisfactory, the results, as a whole, have been gratifying. During the past two years, the writer has conducted over 4,000 tests upon fireproofed wood, the majority being "timber tests." Scarcely any criticism of the method of test has been offered by clients, though the results were often not gratifying.

The specimens for this test are accurately cut to a size 1¼" x ¾" x 12". These "timbers" are tested in pairs by being laid across the top of a 6-inch gas crucible furnace, in which a constant temperature of 926°C.=1,700°F. is maintained. This particular temperature was chosen because it is given by the New York Building Code as approximately the heat of a burning building. At the end of two minutes the specimens are removed, and duration (1) flame and (2) glow noted for each.

The temperature is under constant control by means of a Le Chatelier pyrometer, the "couple" being placed between the two specimens, thus recording the heat exactly at the point of application. The proportions of gas and air are regulated to furnish a vigorous flame 8 to 10 inches above the furnace, so imitating an ordinary fire.

After test, the specimens are sawed in two at the middle and tracings made of the unburned wood. These tracings are then carefully measured by planimeter and the percentage ratios to the original cross-section calculated. The percentage of unburned wood is printed upon the tracing of each specimen, and then blue prints are made which become a part of the permanent record.

The accompanying exhibit contains samples of these blue prints, also a number of tested specimens of different varieties of wood both treated and untreated, showing the comparative results in each instance. It will be noted that the tested specimens show a straight line in the cross-section on the side not exposed to the fire, whereas the untreated specimens are burned on all sides. This is good evidence of the fire-resisting properties of the wood. In general, the untreated woods show a cross-section area approximately 10 to 25 per cent less than the treated samples. However, the value of the "fireproofed" wood cannot be rated by this feature alone. Account must be taken of the tendency to ignite and support combustion. This is indicated by duration of flame and glow after the specimen is removed from the fire. In every instance the contrast in time of flame and time of glow, between the treated and the untreated wood, is very marked. The average duration of each taken from 688 tests on four varieties of treated soft woods was 7 and 12 seconds. The same data taken from 846 tests on four varieties of treated hard woods was 10 and 14 seconds.

Similar calculations based upon tests of untreated wood, though not averaged from nearly so many tests, gave for soft woods, flame, 1 min. 19 sec.; glow, 1 min. 53 sec.; and for hard woods, flame, 2 min. 31 sec.; glow, 6 min. 29 sec.

Those figures give a ratio of 1 to 11 and 1 to 9 for flame and glow between treated and untreated soft woods, also 1 to 14 and 1 to 27 for hard woods. That is, the tendency of untreated woods to burn is 10 to 20 times that of treated woods. This measure of the property of retarded combustion is as important as the determination of the percentage of unburned areas, for in the first stages of a fire, minutes are valuable. Experience has shown that a variation of five per cent should be allowed in cross-section area, because of structural differences in the wood, fluctuation in temperature, and personal error in measuring. In fact, like all investigative work, it is never safe to estimate average values from the results of a few tests.

The advantages of this method of test are: (1) a test-piece of uniform size, large enough for practical comparisons, and small enough for numerous tests to be made with slight waste of material, thus insuring a fair average report; (2) a constant temperature and uniform time of application of heat; (3) an estimate of the tendency to support combustion as indicated by the times of flame and glow; (4) the ability to accurately measure the amount of burn, and make a drawing of same for permanent record — the specimen itself can also be easily preserved for future reference if desired. In brief, every element of the test is practically constant, except the character of the wood and the treatment it has received. Necessarily these must always remain variable.

The lumber is thoroughly dried before testing, and care exercised to keep everything uniform.

The specimens are placed so the side which was originally the outside surface of the board faces the fire. This is necessary because the Building Bureau permits one inch outside treatment on floor sleepers and other large materials, which is encased in concrete or a coating of other fireproofed wood.

It will be noted that hard woods, like long-leaf yellow pine, oak and maple, when treated, differ only slightly in unburned area from untreated lumber.

They are naturally "slow-burning" material. It would scarcely be necessary to fireproof hard wood if the preservation of structural strength were the only consideration. But the danger from inflammability should make a surface treatment imperative. Soft woods which waste rapidly under flame should be treated throughout.

Although treated wood has many advantages as a fire retardant, it also has its failings, the worst being its tendency to become hydroscopic. There are processes which claim avoidance of this tendency to gather moisture when exposed to dampness, but I have had no opportunity to prove their merits. Because of this difficulty, the Navy has discontinued the use of fireproofed wood, except for interior trim, furniture, etc.

When in this damp condition a new difficulty arises, because the chemicals employed produce a corrosion on metals. Neither of these difficulties appear harmful where the wood is ordinarily dry and protected by paint, varnish or oils.

A strong point in favor of the treatment is, that the wood does not seem to become perceptibly more combustible by the application of oils and varnish. Among the experiments I will make at the conclusion of this paper is one designed to demonstrate this feature.

A further defect of treatment is to weaken the wood and make it brittle. Although this does not always result, it is a recognized possibility, and the Navy specifications reject material which has lost over thirty per cent of its original strength.

In New York city no attention is paid to the question of strength, for the method of steel construction does not require the wood to support loads.

Whether the treatments are permanent, I am not prepared to state. Our experience with them is too short to predicate a positive opinion. Samples kept in my laboratory two years show no signs of deterioration, and we have here some samples treated in 1895 which we will test to show they still retain their fire-resisting qualities.

Some processes, however, do employ volatile chemicals, as is evidenced by a bloom which appears on the wood after standing for some time; it is also shown upon the sides of these jars of shavings which are about two years old. So far as my experience goes with lumber treated for New York City there is very little tendency to

this sort of deterioration. Neither has there been any evidence of decay. When used under ordinary conditions of dryness, and protected as it usually is, I see no reason why well-treated wood should not remain sound and effective indefinitely. However, I believe, the question is one to be systematically investigated.

There are two other well-known defects: namely, discoloration and difficulty in working due to hardness. Both of these are increased by excessive treatment, hence the manufacturer is always tempted to lessen the treatment. This fact is the only argument necessary for regularly testing the material as delivered for use.

Last, but not least, from a builder's point-of-view, the wood is costly. But considering the awful destruction of life and property which fire constantly causes, the saving of expense should not be allowed as an excuse for the use of inflammable materials which invite public calamity.

THE UNDERWRITERS' LABORATORIES AT CHICAGO.[1]

THIS experimental bureau was organized in 1893, and originally devoted itself exclusively to testing electrical devices and materials and collecting accurate statistics and reports on fire-losses caused by electricity. Later, its work was enlarged to include all forms of lighting and heating appliances and the testing of extinguishers, retardants, and fire-alarm signal-systems of all kinds.

Up to the present time tests have been completed and reports issued on more than 2,400 separate systems, appliances and materials.

The objects of these tests are to determine the comparative efficiency of all forms of fire-retarding and fire-extinguishing systems and devices, and to secure such safeguards in the construction of all lighting and heating appliances as will reduce to a minimum the hazards incident to their use.

The institution is supported financially by the stock fire-insurance companies doing business in the United States, and by fees collected from the manufacturers of appliances submitted.

All tests are carried out under detailed specifications agreed to by the various National organizations representing the interests affected.

In the electrical department the specifications used are those of the National Electrical Code, which is the recognized American authority on safe wiring and safe electrical construction. This Code was originally drawn, and is extended from year to year, by a convention, to which the following American organizations send delegates: The American Institute of Architects, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Street Railway Association, the Factory Mutual Fire Insurance Companies, the International Association of Fire Engineers, the National Board of Fire Underwriters, the National Electric Light Association, the Underwriters' National Electric Association, and the National Electrical Contractors' Association.

The names of such appliances as are shown by the tests to meet the specifications are printed in a list which is issued quarterly. All manufacturers whose names are given in the list are required to enter into a contract with the Laboratories covering their factory practices, and samples of all articles listed are purchased in the market from four to twelve times a year, and re-tested to discover any departure in later factory practices from the standard set forth in the requirements.

This work covers every electrical appliance in common use whose introduction may have any bearing on the fire-hazard. It secures the active coöperation of all of the manufacturers in the United States, from the largest to the smallest, all of whom make a practice of submitting new appliances to the Laboratories before putting them on the market. In this way hazardous features are eliminated at the outset, and the number of fire-losses is correspondingly reduced.

A practice similar to that inaugurated in the electrical work has been followed in the departments since organized, and the lists of approved fire extinguishing and retarding appliances thus far issued, like the electrical lists, are followed generally in the classifications and ratings of the insurance companies and in the specifications of architects, engineers and builders.

In a similar manner the disapproval of the Laboratories tends to keep faulty appliances out of building equipments.

Over 30,000 copies of the quarterly electrical lists are regularly called for, the quarterly lists of permitted gas-machines and systems reach 28,000 copies, and the lists of approved extinguishers, watchmen's time-detectors, and other signal-systems are coming into quite as general use.

Coupled with the Laboratory work in all departments, careful watch is kept on the record in practice of all the appliances covered; more than a thousand correspondents located throughout the United States are reporting regularly to the Laboratory organization, and prompt reports are received of the failure or apparent failure of any listed device successfully to perform in service. This feature of continuous record of field experience is considered quite as valuable in an instructive way as are the Laboratory experiments themselves.

In the retardant work gas-ovens have been built, the largest capable of reproducing the severest possible fire conditions over an area equal to that of standard-sized fire-doors. The gas used is obtained by pipe connection with the natural-gas fields in the State of Indiana, a very large continuous supply being available and the gas being peculiarly well-adapted for fuel.

Electrical power is used throughout the Laboratories, including the hydraulic department, a recent addition being an electrically driven fire-pump capable of delivering 500 gallons of water per minute at 100-pounds pressure. This department, which covers the test-work on hose, hydrants, valves, automatic sprinklers, nozzles and similar apparatus, is also equipped with a 5,000-gallon reservoir, a 4,500-gallon pressure-tank, a 6-inch standpipe 70 feet in height, and a large amount of small apparatus for pressure-work and measurements.

In the department devoted to lighting and heating, other than electricity, 380 different makes of acetylene-gas generators and 200 devices and appliances using petroleum and its products have been tested and reports issued.

In the electrical department examinations, tests and reports have been made on 1,650 different devices and materials.

The plant at present occupies one two-story and basement brick building with yards adjoining, and a storage floor in a second building. Six resident engineers and a total of eleven persons are constantly employed, all of whom devote their entire time to the work.

Each department is supervised by a Committee of Consulting Engineers appointed by the various National Associations having the different subjects in charge, the members of which are residents of different sections of the United States. All Laboratory reports are issued to and reviewed by these Committees before being utilized as a basis for the Lists of Approved or Permitted Devices and Materials issued by the National bodies.

The Protective work is covered by a Committee of the National Fire Protection Association, the Electrical work by the Underwriters' National Electric Association, and the work on Lighting and Heating, other than Electricity, by the Committee of Consulting Engineers of the National Board of Fire Underwriters.

The plant is, I believe, unique in the character and extent of the work it carries on, and is the only institution in the world comprehensively covering the fields of fire-protection and the fire-hazards as they apply to all devices and materials introduced for general use.

[1] A paper by William H. Merrill, Jr., prepared for the International Fire Prevention Congress, held in London, Eng., July 7-10, 1903.

MILAN NOT A SUMMER RESORT. — Milan is in summer the hottest city in Italy, the temperature not being influenced by the ocean or the mountains, as in Venice, Genoa, Naples, Palermo, Bologna, Florence and Rome. Consequently there are few villas near Milan, whose wealthy families spend their summers preferably along Como and the other Italian lakes. — *Exchange.*

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

INTERPRETATION OF CONTRACT.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — A certain specification contains this provision: —

"The Building Law of the City of Boston is made a part of any contract based upon the specification."

The Building Law, Section 78, requires that —

"Outside windows or openings of every elevator-shaft shall have three vertical iron bars painted red, equally dividing the opening."

Does this clause in the specification above quoted require the contractor at his own expense to provide these vertical iron bars? W.

[WE think that it requires the contractor, without question, to furnish such bars. — EDS. AMERICAN ARCHITECT.]

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

A COMPETITIVE DESIGN FOR THE IMPROVEMENTS AT THE U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. FROST & GRANGER, ARCHITECTS, CHICAGO, ILL.: QUADRUPLE PLATE.

GENERAL PLAN OF THE SAME.

SECTIONAL VIEWS OF THE SAME.

Additional Illustrations in the International Edition.

THE SOLDIERS' AND SAILORS' MONUMENT, RIVERSIDE PARK, NEW YORK, N. Y. MESSRS. STOUGHTON & STOUGHTON, ARCHITECTS.

SOUTHEAST VIEW OF THE SAME.

DETAIL OF TERRACE OF THE SAME.

Entrance to Soldiers' and Sailors' Monument, New York, N. Y.

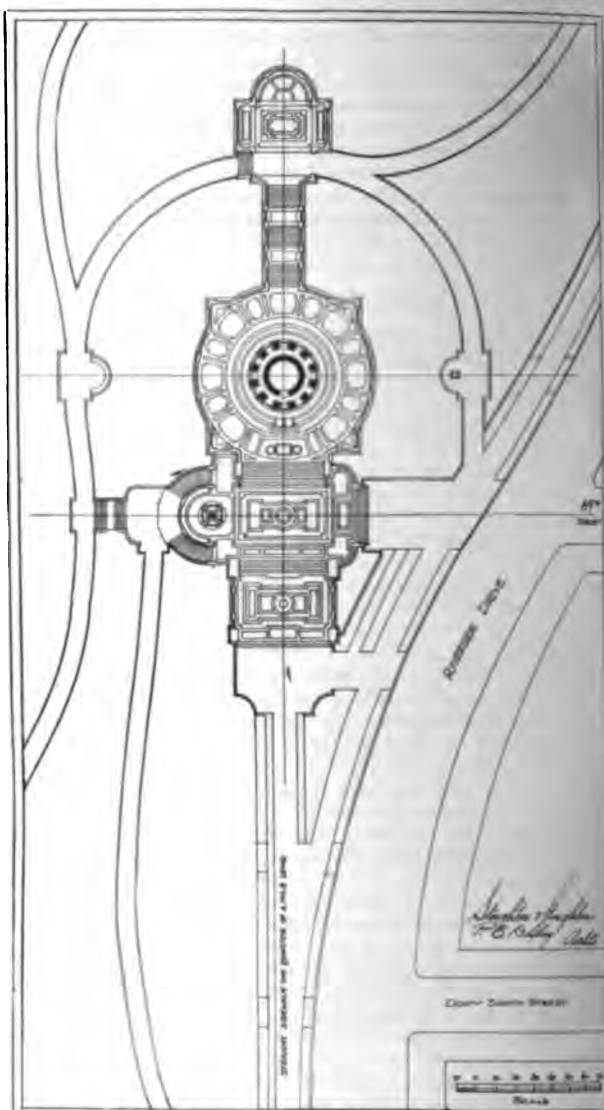
THE CANTORIA IN THE SISTINE CHAPEL, PALACE OF THE VATICAN, ROME.

NOTES & CLIPPINGS

Fireproof Stadia. — The plan of a fireproof stadium to be erected on Soldiers' Field, Cambridge, has been anticipated by the completion of a similar structure dedicated to a different purpose at the University of California. The latter building is an open-air theatre, made of concrete, which stands in a grove of trees forming part of the general scheme of the college buildings. Its plan is a close reproduction of the old Greek Theatre of Dionysius, and it has a seating capacity of 8,000 persons. When President Roosevelt spoke there in May the theatre was filled for the first time. These two fireproof, permanent buildings are the first of their kind in this country, but they will undoubtedly be copied soon in those localities where the frequent occurrence of important athletic contests justifies them. The burning of the large south stand on Soldiers' Field during the course of the Harvard-Princeton game a few weeks ago serves as a clear illustration of the dangers to which the enormous crowds at popular spectacles are at present regularly subjected. The danger is multiplied when the timber stands entirely enclose an area, as they do on many college fields, thus leaving an entirely inadequate means of exit in case of fire. — *Boston Transcript.*

Demonstration of Irrigation. — One of the notable exhibits in the United States Building at the Louisiana Purchase Exposition will be furnished by the Geological Survey. Prof. A. H. Thompson is now in the valley of the Salt River, gathering data which will be used in the construction of three models that are to demonstrate the Government's irrigation plans to the uninformed public of the Eastern States. One model will be of the 250-foot Tonto storage-dam; the second will include a section of the box canyon below the dam, and the third, showing a typical irrigated area, will be a close reproduction of Mesa City, on a scale of 21 inches to the mile. The last model will show every house, farm and orchard, as well as all the ditches, with their head-gates and power-works. Mesa City is a model irrigated community. Originally settled by the thrifty Mormons, the holdings are small and the utmost use is made of every acre. It is situated on a fertile table-land about eighteen miles east of this city. — *N. Y. Tribune.*

Lime in the Ocean. — As the geologist wades about among the pools or follows the shore line at low water he is impressed with the prodigious amount of lime segregated from the sea water by the superabundant marine life exhibited on all sides. Every pool, every



Plan of the Soldiers' and Sailors' Monument, New York.

rock, is teeming with life of some kind, and most of these organisms have secreted a certain amount of lime from the sea water to form their shells or their bone, internal as well as external, structure. Most of the pools are lined with so-called "sea mosses," more strictly calcareous fern-like corallines of pink or purple hues, the lime secreted by minute polyps. In addition to this, there are many forms of algæ, or sea plants, that secrete lime. Considerable masses of a structureless limestone are so formed in the Bay of Naples. Apart from the vast beds of sea shells we know to be secreted in the mud and sand, as well as those shells, like the abalone, found under the rocks, an enormous amount of segregated lime is represented by various forms of crustacea, particularly of the worm or annelid family, encased in tubes of lime. These tubes cover the floors of caves, while the walls are still more densely coated with limpets and rock barnacles, while in the crevices hundreds of little crabs crawl about and menace you with suspicious eyes and formidable claws, and hermit crabs carrying their whelk shell home on their backs swarm in the pools. With such a teeming superabundance of lime-gathering life, the mining geologist no longer wonders at the vast amount of limestone he meets with in the marine rocks, in which his blanket veins of lead and silver are found, as at Aspen and Leadville, Col., and throughout the world generally wherever lead abounds. He sees now how it is that he occasionally finds a fossil sea shell in the limestone walls of his mine, and only wonders he does not find more. In mines farther east he would find the limestone composed of nothing but a mass of sea shells. Deposits of comminuted shells and coral sands, thrown up on shore by the stormy waves, may be cemented into a compact rock, or limestone, by the redeposit of carbonate of lime between the fragments. In such a way is formed the "shell limestone" of Florida, and doubtless many of our old fossiliferous limestones were formed in this way. — *Mines and Minerals.*

Public Dental Oversight of Schoolchildren. — Since last October the children in the public schools of Strassburg have had a chance to have their teeth taken care of free, the city paying the dentists. Among 10,661 children only 165, or a trifle more than one per cent, were found to have sound teeth. — *Exchange.*

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No. 43. *No. 43.*

"Topical Architecture"

PUBLISHED JULY 15,

is devoted to

"Gates and Railings"--VIII.

Classified Index Continued.

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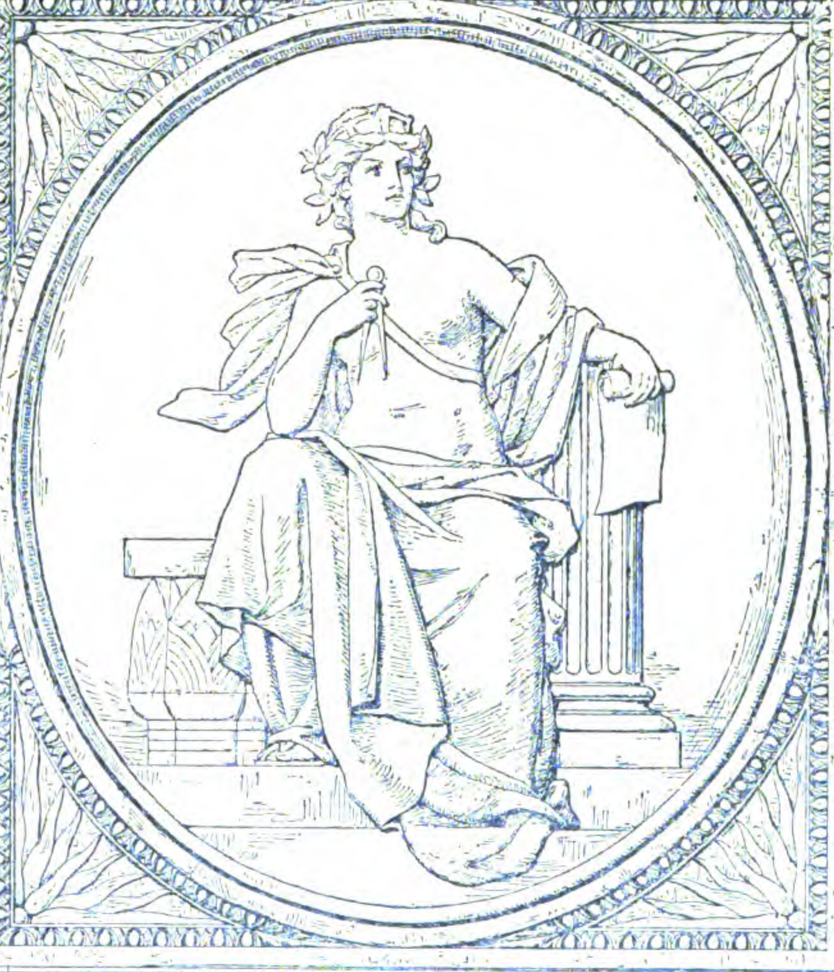

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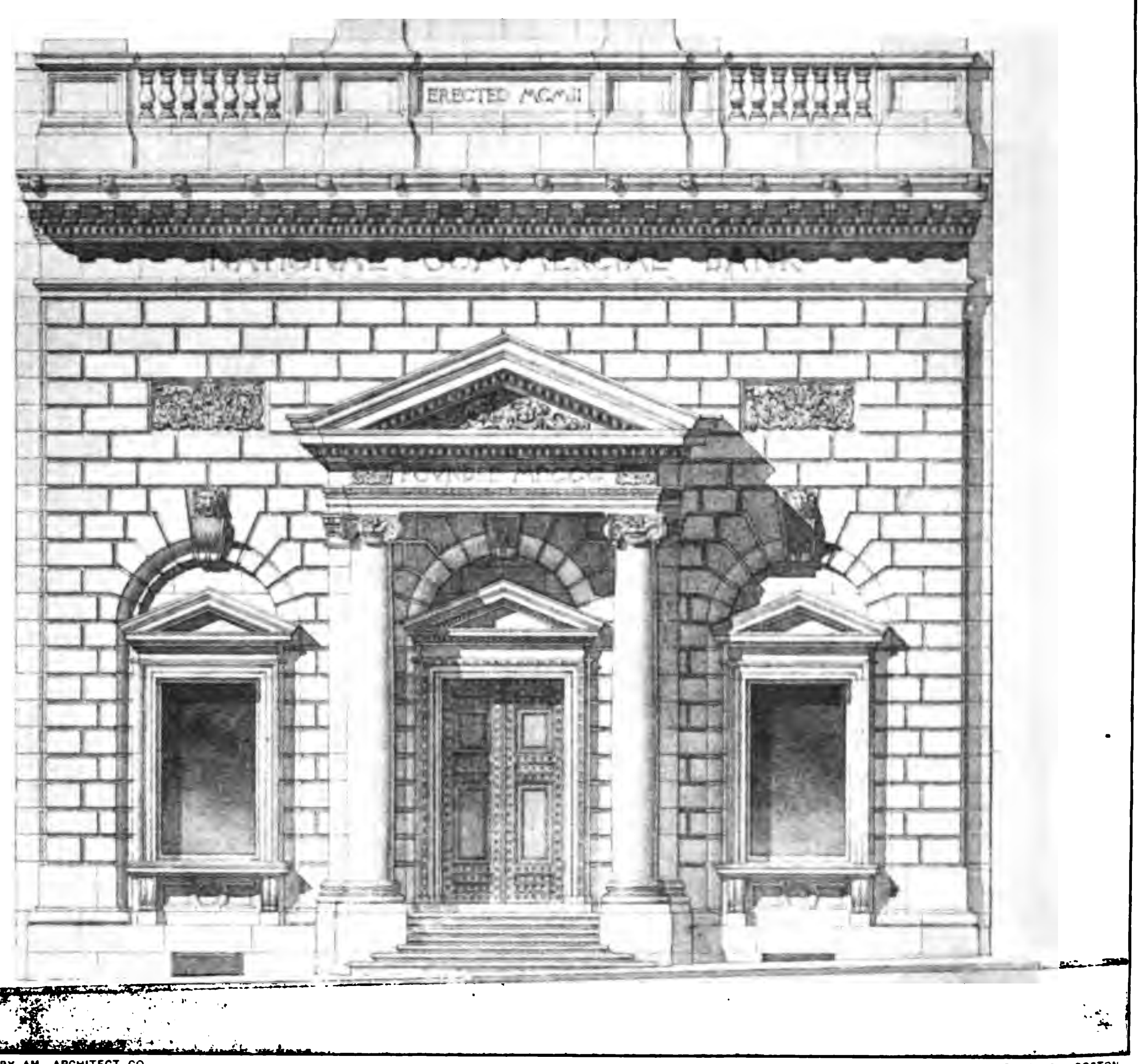

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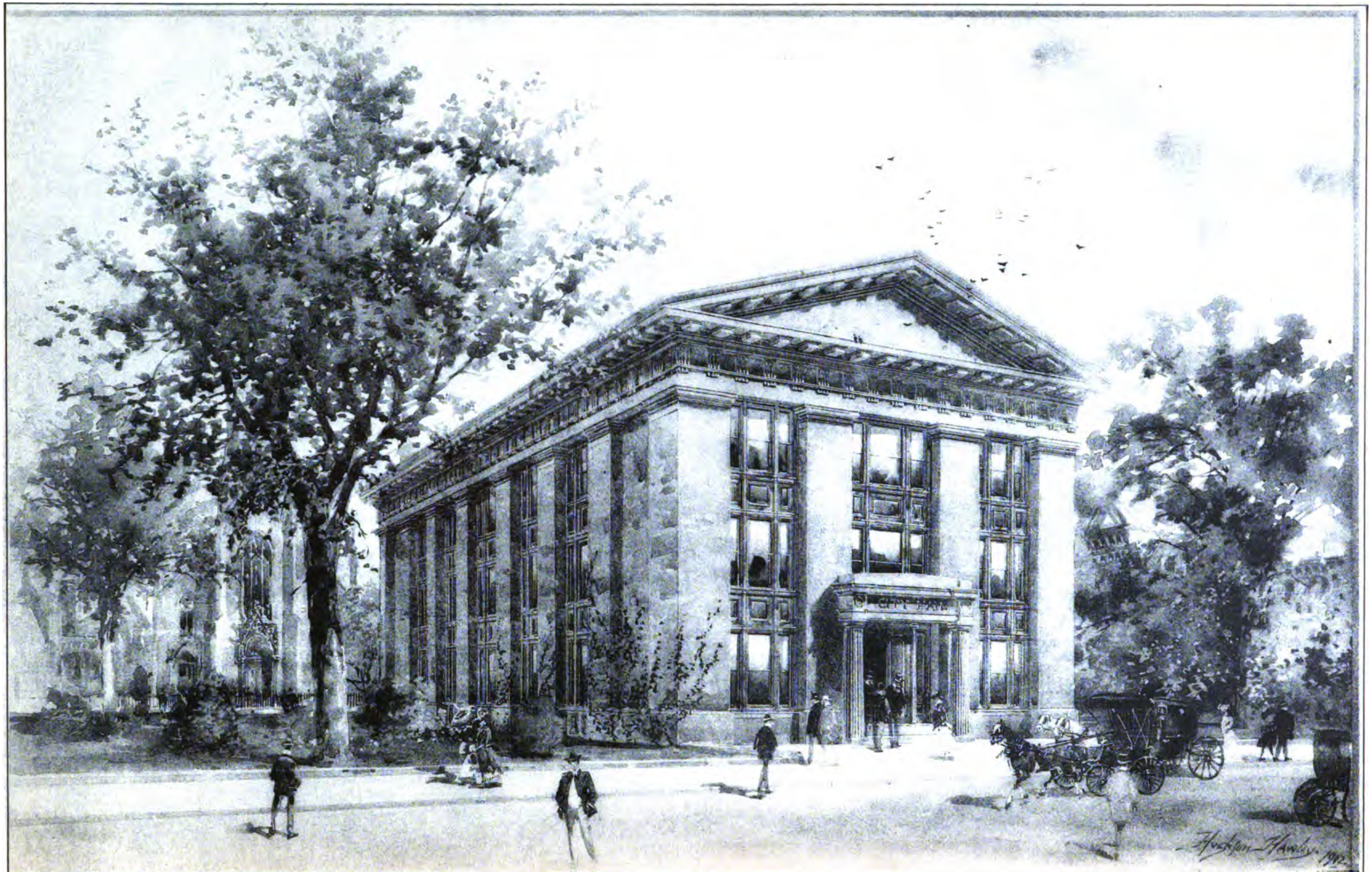

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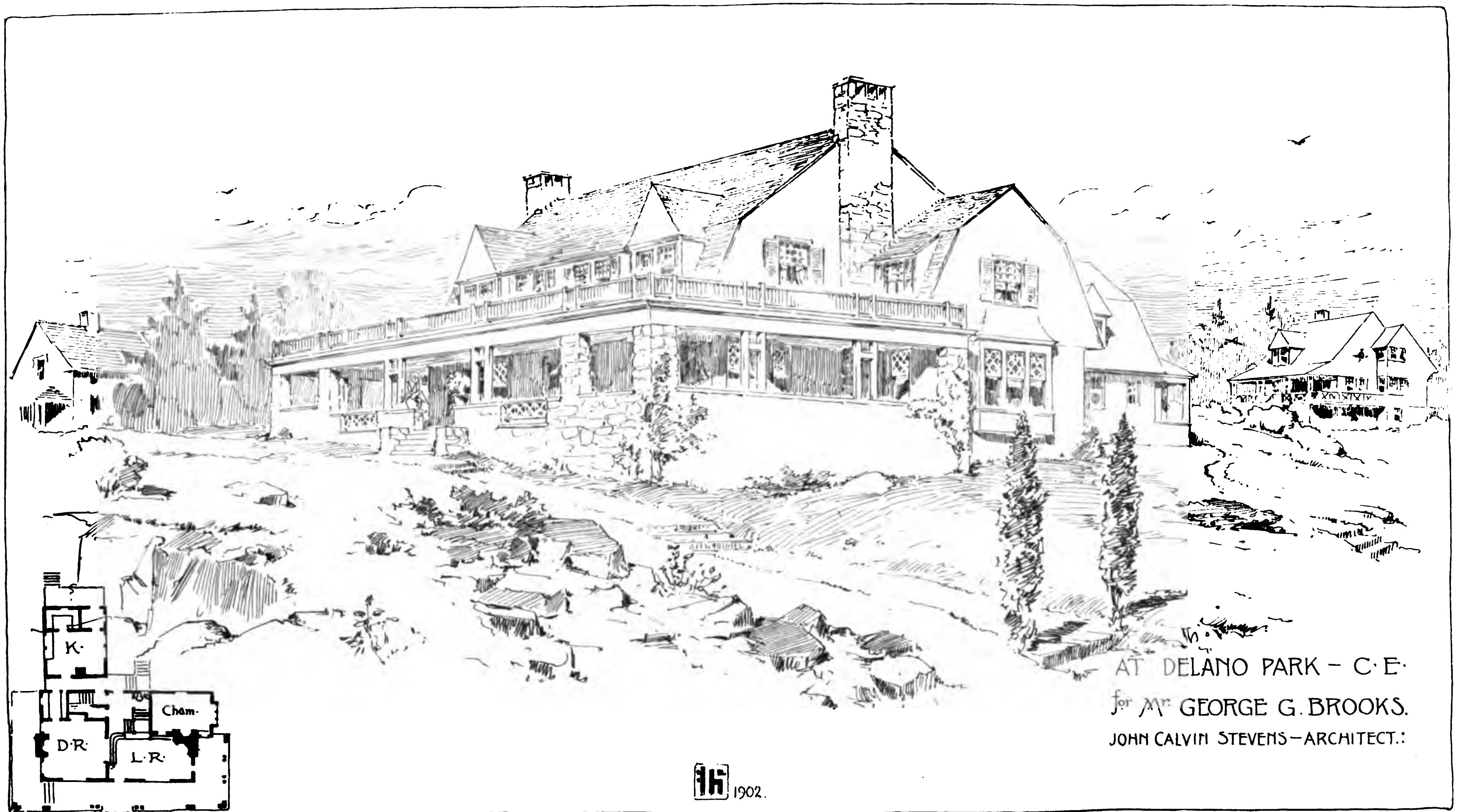
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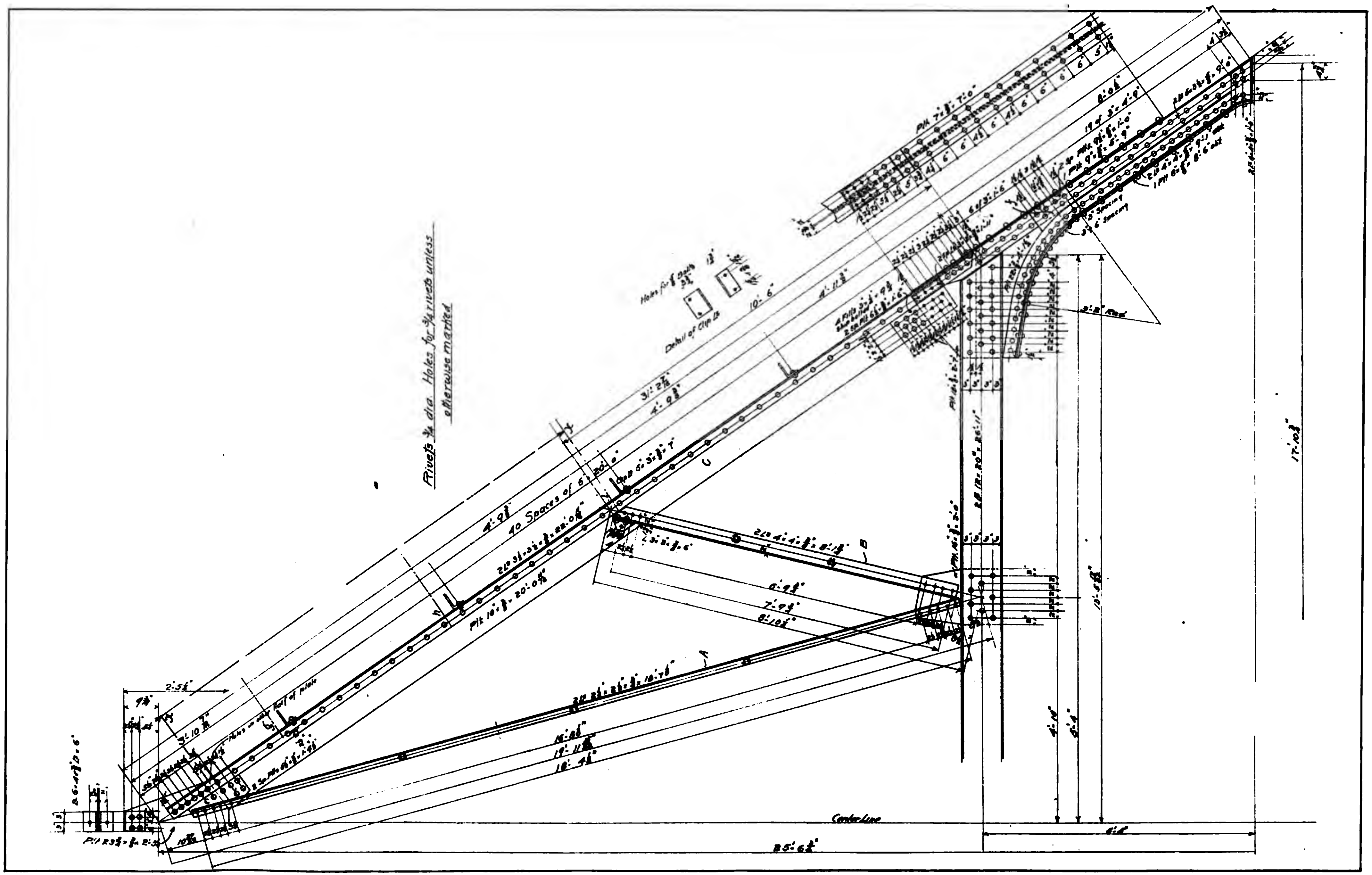

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FIG. 127. NOTES ON IRON AND STEEL CONSTRUCTION.

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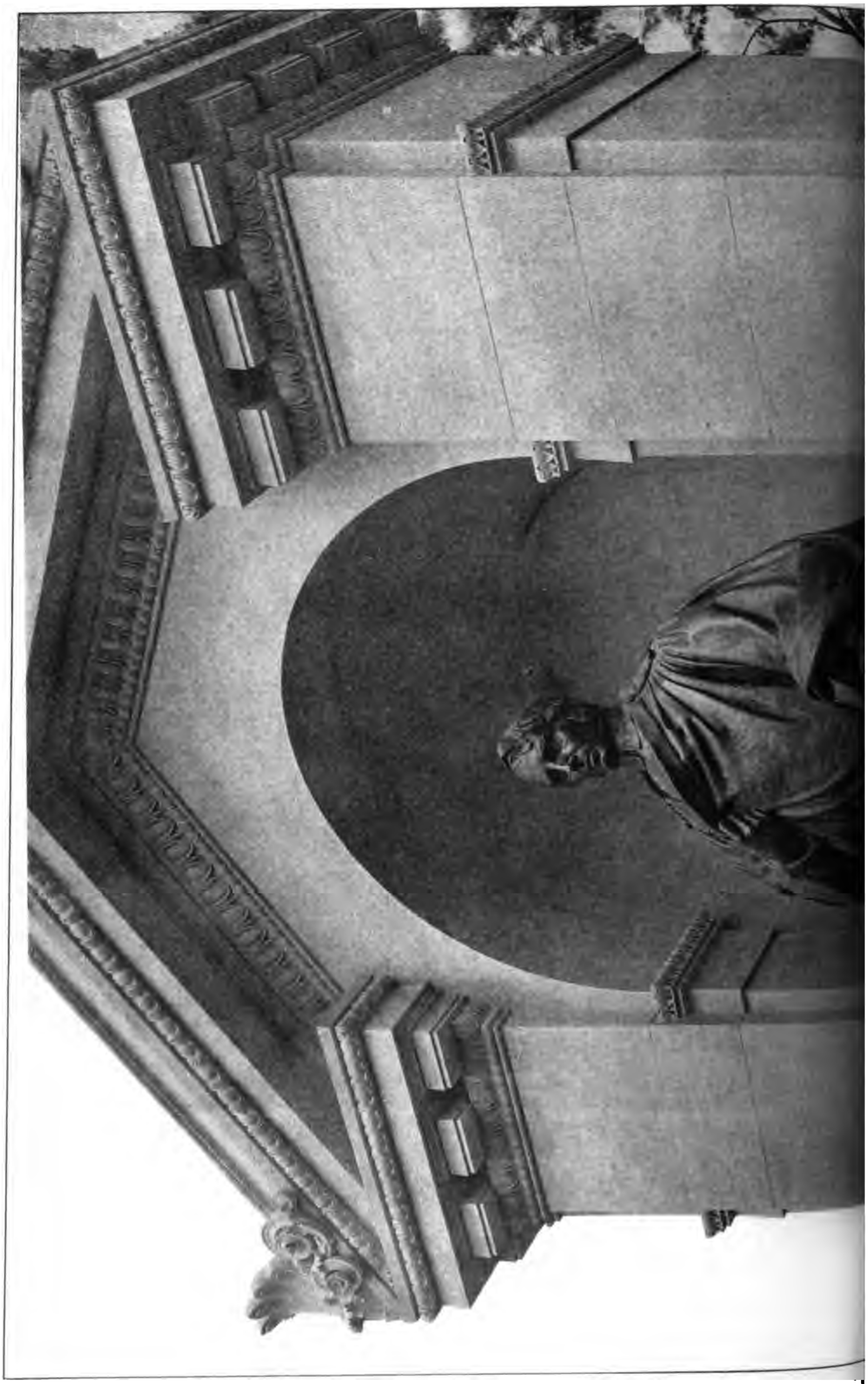

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HERBERT ADAMS, SCULPTOR,

The American Architect
Aug. 29, 1903.
No. 1444.

THE AMERICAN ARCHITECT AND BUILDING NEWS

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CONTENTS

BOTH in New York and Chicago there are complaints from those who ought to know about the matter that the sub-contractors of the city are in league with each other and with the labor unions to exclude competition, and raise prices to an extortionate point. The large contractors compete with each other sharply enough, but they are obliged to sublet different portions of their contracts, and for these portions they must pay whatever price the local combination may dictate. If they rebel, and accept bids from outsiders, they are likely to find their operations blocked by a strike of the workmen in the trade concerned; and, rather than subject themselves and their patrons to annoyance and loss, they submit to the terms dictated to them, of course making their contract price cover the extortionate sub-contracts which they know that they will be obliged to make. This system has, in Chicago, produced its natural effect of checking building operations, as people who have money to invest, and intelligence enough to invest it prudently, do not care to put any of it into contracts at exorbitant and artificial prices. Building work having nearly ceased, the prices of some of the materials controlled by combinations have been reduced; but it is suspected that the prices will be put up again as soon as the market improves, so that the concessions have been so far without effect.

IT is hardly necessary to point out that these combinations are carried on, in the end, at the expense of the workingmen. The walking-delegates, who assist with strikes and threats of strikes the plans of the sub-contractors, presumably get their share of the profits, but none of this goes to the workingmen themselves, who simply see their rents increased and themselves thrown out of work, in support of conspiracies in which they have no interest. In New York, a beginning has been made at the exposure of the corrupt bargains by which the poor are plundered far more than the rich, and, if President Roosevelt has his way, publicity, the best antidote for corruption, will be applied more generally to such cases than has hitherto been possible, much to the advantage of honest people.

THE Cleveland papers publish illustrations of the famous scheme for grouping all the public buildings in the city, as now recommended by the Commission. The original plan, of making a park on the lake front, and grouping certain public buildings on it, is held to be impracticable, and a new scheme has been prepared, by which the union railway-station is made the centre of a vast, symmetrical group of buildings. This project, by which the railways occupy a large tract of land which it was hoped to retain as a park, meets, apparently, with some popular objections, but the Commission, consisting of Messrs. Burnham, Carrère and Brunner, say, with much reason, that a railway-station, although belonging to a corporation, is a public building, and not only deserves to be, but should be, studied in connection with structures more purely municipal. What will be the result of the discussion no one can predict, but architects will find great interest in the Commission's idea.

THE Secretary of the Treasury has removed the special architect of the Chicago Government Building, Mr. Henry Ives Cobb, for reasons which are not stated. There have been many complaints of the slowness with which the construction of the building has proceeded. The first appropriation for it was made early in 1895, and it was then estimated that five years would be required to complete it, but now, after nearly nine years, it has neither a window nor a floor. Whether Mr. Cobb is in any way responsible for the delay is not stated, but the newspapers say that he has for some time been without actual authority in connection with the structure, all his recommendations being passed upon by the Supervising Architect of the Treasury, after independent examination of their merits. It is said to be probable that no other special architect will be appointed for the building, but that the Supervising Architect will provide for its completion.

WE wish that one of the brilliant lawyers who devote themselves so ably and unselfishly to the public good would take in hand the subject of legislation, or, perhaps better, of judicial procedure, for repressing the swindling, to call it by its proper name, which is met with everywhere in this country. We once met in Europe a German business-man, who expressed himself vigorously in regard to the mercantile methods of the Italians with whom he had had dealings. "In Germany," as he said, "you can trust a man, but in Italy everything is swindle, swindle, cheat, cheat." It must be confessed that this country has not always appeared, to foreigners, to keep its eye steadily fixed upon the beacon light of perfect integrity, but the reputation of American business-men and methods has greatly improved abroad of late, and it is a matter of national importance to guard our mercantile honor as Holland and England guarded theirs in their days of prosperity, and as Germany is trying to guard hers.

ANOTHER needed reform, which might be carried out in a few days in any State which has a board of railroad commissioners, acting in conjunction with the Inter-State Commerce Commission, is the requirement that all railroad tickets shall have their price printed on them, as the law makes compulsory almost everywhere in Europe. No one who does not travel much has any idea of the vast aggregate of the frauds, petty in themselves, but repeated hundreds of times daily, which are perpetrated upon travellers by railway in the ticket offices of the stations in the great cities. Nine people out of ten, in this country, in buying a railroad ticket, the exact price of which they do not know, put down a piece of money, take whatever change the ticket-seller chooses to give them, and put it in their pockets without looking at it. Even if they did look at it, they would be none the wiser, and the ticket-sellers are practically free to swindle them out of whatever amount they can take without attracting their attention too sharply. Where the victims are poor people with families they are sometimes robbed of considerable sums; and the evil seems to be increasing.

WHERE the price of the ticket is printed on it, the purchaser is enabled, however hurried he may be, to compare, later, the price marked with what he gave for it, and, if he chooses, to demand the correction of the "error." We once had occasion to test the value of this system, on purchasing, at an Italian ticket-office, tickets for a party for a journey of considerable length. As we happened to know exactly what were the denominations of the bills which we gave in payment, it was easy, in comparing the change, on our way back to the hotel, with the price printed on the tickets, to discover that the change was fifty francs short. Fortunately, we had some hours before the departure of the train, and, as the result of some very pressing representations, the fifty francs were refunded. The tickets were for an international route, and the guide-books did not specify clearly the proper price; so that, if this had not been printed upon them, we should probably

never have suspected the mistake. Most tourists in Italy can tell of similar experiences, except that they do not usually succeed in getting their money back, and, in this country, travellers have practically no protection.

THE receivers of the Norcross Brothers corporation have resorted to a novel expedient for securing the bonds which they propose to issue, by insuring the life of Mr. O. W. Norcross for five hundred thousand dollars. As Mr. Norcross is sixty-three years old, the premium paid must be a very substantial one, and some of the creditors will question whether the cash required for the purpose might not have been with advantage applied to the debts of the concern; but Mr. Norcross, at least, will have reason to consider the action a compliment to himself, and to the administrative ability which the receivers think would be replaced with such difficulty. We hope that it may be many years before the policy is presented for payment.

MANY of our readers have probably witnessed such transactions as the following: A client, distinguished for his "business talent," has received bids for the construction of his new house. The lowest estimate, we will say, is twenty-five thousand dollars. The client sends for the lowest bidder, who, as he has ascertained from the architect, is a skilful and honest man, and informs him that he has received a bid from a responsible party to build the house complete for twenty thousand dollars, but, in consequence of the very favorable accounts which he has received from the architect and others, he is disposed to give him the preference, to the amount of a thousand dollars, and that if he will reduce his bid to twenty-one thousand dollars, the matter can be settled on the spot. Most architects, if they understand that their client is simply lying, have courage enough, under such circumstances, to interpose some feeble protest; but, in most cases, the client deceives them, as well as the builder, by pretending to have received the alleged bid from an outsider; or he may carry on his negotiations with his victim without the knowledge of the architect, who, even if he knows the facts, does not feel justified in betraying unreasonably his employer's interests for the benefit of a man unable to look out for his own. If the contractor is credulous, and anxious for the job, the chances are that he thinks he must have made some mistake in the figures, and that he agrees to the owner's proposition, and endeavors to carry out the building for less than cost, and is partly or wholly ruined in the attempt. If he pulls through, the chances are that he retains a grudge against the architect, which may injure the latter, even though innocent of all complicity in the matter, and he is very likely, if he has an opportunity, to meet guile with guile, by joining one of the secret cabals of contractors which have done so much of late to keep up the cost of building, and, in consequence, to check building operations.

IN the end, it is the community which suffers from frauds of this kind, which are everywhere prevalent, and it is the community which should put a stop to them. It is quite possible that at common law a contractor who had been induced by falsehood to sign a losing contract could recover the difference between the contract price and his original bid, and Master Builders' Associations, or similar bodies, would do a service to the public by testing the matter in the courts at the first opportunity. The fact that a bidder signed a contract for less than his estimated price would be evidence that some inducement had been held out to him to do so, and the inability of the owner to produce in writing the lower bid which he claimed to have received, or to tell a story which would stand skilful cross-examination, would be almost conclusive as to his fraudulent conduct, independent of that of other witnesses. If the principle were established that contracts could be set aside for fraud of this kind, a beneficent revolution would soon be accomplished in American business methods, to the immense advantage of American trade in general, as well as of honest American business men in particular.

THE editor of the *Builder* gives an account of his experience in the matter of tests of stone which will afford architects food for reflection. A certain quarry-owner had made public the results of "tests" of the crushing strength of the stone from his quarry which attracted the attention of the editor, who knew that the quarry produced only a soft limestone, and observed that the alleged tests indicated a resistance about five times as great as the usual strength of such stone. Some time later, the quarry-owner was asked how it happened that his stone showed such remarkable results; and, in a burst of frankness, he replied that, as he was going out of the stone business, he did not mind confessing that he had sent cubes of granite to be tested, purporting to be his limestone, and the expert who made the tests "did not know the difference." From this occurrence, and similar ones, the editor argues that it would be an excellent thing to have in England some authorized testing establishment, similar, as he says, to that at Cornell University, and in other places in the United States. He has apparently forgotten the splendid Government testing laboratory at Watertown; but, in any case, there is no doubt of the necessity, in all civilized countries, of establishments where the materials of engineering and architecture can be thoroughly and impartially tested, for the benefit of all concerned.

THE annual competition in Paris for the Prize of Rome in Architecture has resulted in the award of the Grand Prize to M. Jaussely, pupil of MM. Daumet and Esquié. The first second grand prize was awarded to M. Wielhorski, pupil of M. Laloux; and the second second grand prize to M. Joulie, pupil of M. Pascal. The subject of the composition was an unusually interesting one, being the arrangement of a public place. The programme indicated something closely resembling the Place de la Concorde, specifying that the open space should be bordered on one side by a river, crossed by a monumental bridge, and should be the terminus of several streets; while, facing upon it, should be three important buildings, a Bourse, a military club, and an artistic club, with gardens, porticos and so on; the open space itself being also adorned with statues and monuments. The whole composition, including the three buildings, was required to be contained in a space, the longest dimension of which should not exceed three hundred and fifty metres. Although floor-plans of the three buildings were required, the scale of them was small, and, as it proved, they did not count for much in the award. The problem was so similar to those which are at this moment agitating municipal authorities in this country that the publication of the competing plans will be awaited with much interest.

LE GÉNIE CIVIL gives an interesting description of the new turbine steamer just placed on the route between England and France, between Dover and Calais. Every one remembers the ill-fated torpedo boats, the "*Viper*" and the "*Cobra*," constructed on the turbine system for the British Government, which, after showing a speed of forty-two miles an hour, in several trial trips, broke in two, while at sea, and were lost with all on board. In the new Channel steamers the defects in strength of the naval vessels have been avoided, and the speed required is much less, an average of twenty-five miles an hour being sufficient for the service; but, on special occasions, much greater swiftness can be attained, the most recent boat, the "*Queen*," having crossed from Dover to Calais, a distance of nearly thirty miles, in fifty-one minutes. As in all modern turbine steamers, the same shaft is used for two or more propellers, the three shafts of the "*Queen*" carrying five propellers for forward movement, and three for backing, the latter being so arranged that they can be connected to the shaft, and the others thrown out of action, without stopping or changing the rotation of the shaft. Whether this is accomplished by Mr. John Jacob Astor's invention or not we cannot say, but the system appears to be very effective, the "*Queen*" being easily stopped in two and one-half lengths, while running at twenty knots an hour. This is a much better result than is usual with reciprocating engines, so that the old reproach of turbine steamers, that their movement could not be reversed, is more than removed.

IT may surprise some of our readers, as it has us, to learn from the French papers that a new cathedral is now being constructed in New York which is to have a dome sixteen feet higher than that of St. Peter's, in Rome. This dome is to have at its base four half-domes, and ten smaller half-domes are attached to the latter. This cathedral is dedicated to Saint Sophia, and is, we are told, for the use of the Catholics, whether Roman Catholics or Greek Catholics is not mentioned. The cost of the structure is estimated at ten million dollars. Where it is situated we are not informed, but it certainly seems destined to be one of the architectural wonders of the city.

NOTES ON IRON AND STEEL CONSTRUCTION.[1] — XVIII.

THE stresses in framed structures are readily determined by applying the geometrical and analytical methods given in the previous articles. It remains for the designer to work out the sizes of the various members, and the details of the connections from the stresses so determined. The making of such working-drawings as is necessary for the execution of the structure is not accomplished by any fixed rules or methods. The efficiency of the design by which the rigidity of the structure is insured under all conditions of loading, and the economical production of the work accomplished, depends to a decided degree upon the judgment and experience of the designer.

Before the truss or frame can be properly designed the exact distance between supports must be known, and if the work has already been erected it is advisable in all cases to take careful measurements of these distances rather than to depend upon the dimensions given on plans. Frequently buildings, though carefully constructed, are some few inches out on their principal dimensions, and if the exact span of the truss can be determined a better bearing upon the capstone is insured.

Where the truss or frame has been designed on an economical basis and the wall assumed to provide a certain amount of lateral support, its stability should be carefully calculated. In order to fix the determination of stress and that accurate stress-diagrams may be drawn, rigid ribs of steel are usually pin-connected at the heel and apex, and the design so arranged that the stresses in the several members are transmitted through the centre of the pins. In this manner the line of resistance in the rigid rib is known, for it must pass through the pin connections at either end and at the apex.

Where trusses are supported upon corbels the centre of effort of their reaction must be found, and the moment of this reaction upon the corbel considered about some point adjacent to the edge of the wall. It is usual in designing corbels supporting important frames to consider the centre of moment at least 1 inch inside of the wall. This precaution is taken from the fact that the masonry beneath the corbel has little bearing value so near the edge, as under great pressure it would chip and spall. The corbel must extend into the wall a sufficient length, and the weight of the superimposed wall above the corbel must be capable of exerting a moment about the centre of moments that will more than equal the moment created by the reaction of the truss. Not only must these several points be considered, but the transverse strength of the corbel must be analyzed in order to determine whether it is likely to fail by rupture, and besides, the shear of the corbel at the edge of the wall must be investigated.

The purlins supported upon steel frames which carry the roof construction are of either timber or of steel; when of the former they are commonly supported upon the top member of the frame and held in place with angle-iron clips, the ends of the purlins being commonly bolted to the clips in order to furnish some lateral support for the truss, and to prevent them from being displaced. When the purlins are of steel, light I-beams, or, more frequently, Z-bars, are used. These are either butted against the cheek of the top member and held in place with angle-iron clips, or else are bolted to the top flange of the chord member. Upon the purlins light common rafters are laid and not uncommonly the sheathing is laid diagonally and nailed to these rafters. The preference for a diagonal sheathing is that it adds considerable to the rigidity of the roof. Buildings of ordinary size over which the roof is supported upon steel trusses usually have end walls or gables, in which case no lateral bracing between the trusses need be provided. In large buildings, and particularly in open sheds such as are used for stations and depots, a carefully designed system of bracing should be provided. In most roofs of long span several systems of bracing will be employed. There will commonly be deep latticed trusses between the principal supporting columns, and probably several secondary latticed braces connecting vertical or diagonal members of adjacent trusses. To further stiffen the structure square tension-bars provided with turn-buckles run from corner to corner of the panels formed by the trusses and the latticed bracing. Large end-trusses of train-sheds must be wind-braced by providing a horizontal truss system — that is, trusses are built out horizontally from the vertical plane of the roof-truss, these being securely held in place by hangers and braces.

After the several stress-diagrams have been drawn for the frame it will be found that the combined stress is not always the maximum, for frequently a member will be in compression from the dead-load and in tension from the wind-load. Each member in the truss must, however, be always designed for the maximum stress, and where steel members are subjected to alternate compressive and tensile stresses, the allowable unit-stress for both compression and tension should be about 25 per cent less than the usual unit working-stress. In designing steel tension-members in buildings, unit-stresses as high as 18,000 or 20,000 are allowable. The member must, however, be carefully investigated, and its net section accurately determined by deducting all of the metal cut away for rivet-holes in any plane. It is not advisable, where a tension-member consists of two angles back to back, to employ greater unit tensile stress than 12,000 or 15,000 pounds from the fact that these members are usually connected to a gusset-plate through one leg of the angle only. This design does not permit a stress to be conveyed in a line axial with the centre of the rolled section; so that, the side pull tends to produce a tearing effect rather than a direct stress.

[1] Continued from No. 1432, page 78.

Where a tension-member is connected to a gusset-plate and sufficient rivets cannot be placed in a single line without greatly increasing the size of the gusset-plate, angle clips may be employed in the method shown in Figure 126. In this way the resistance of the connection at the end of the member may be greatly increased, and the strength of the net section realized. All tension-members in composite-trusses — that is, trusses in which heavy timbers are used for the rafter and compression members, and steel or wrought iron for the tension-members, are most conveniently made of round or square bars. When the tension-members are pin-connected through castings which support upon a square bearing the timber-members, it is preferable to make the tension-members of square bars, for with these bars an eye or loop is most conveniently turned, and a good bearing secured on the pin. It is most economical where round or square bars are used for tension-members, and a threaded end is required, to upset the end of the bar. In no instance should the upset end of the bar be a separate end welded to the principal piece; the upset should be formed directly upon the rolled bar. All tension-bars in composite trusses should be provided with turn-buckles, for only by this means is the exact distance from centre to centre of eye obtained, and besides, it is pertinent that some method of adjustment should be provided in order to take up sag, slack or shrinkage in the timber-members. Angle bars connecting, back to back, as a tension-member, when of greater length than 10 times the shortest leg of the angle, should be provided with separators, the separator consisting of either a piece of bar iron, or washers secured between the adjacent leg of the angles by rivets. If these separators are not provided at frequent intervals in long tension-members, the angles are apt to strike one against the other from vibration in the frame which will cause disagreeable chattering. Roof-trusses constructed of rolled steel-members are usually formed of rolled shapes placed back to back so that all of the stresses will be distributed symmetrically in a vertical plane. In the construction of such trusses economy of workmanship supplants economy of material; and though the stresses, from the diagrams,

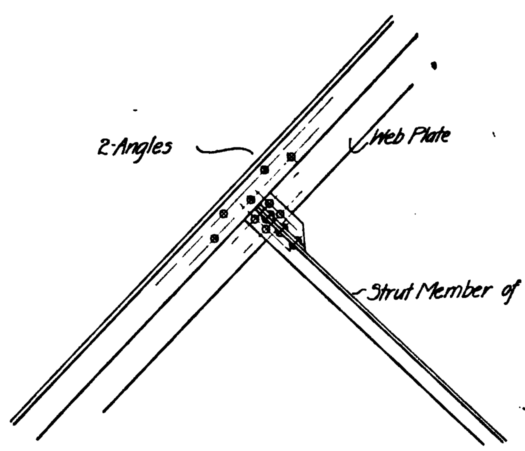


Fig. 126.

would indicate that ⅝-inch rivets could be used in one place, while ¾-inch were required in another, such practice would necessitate the changing of the dies in the punches and riveters, and would cause considerable confusion and movement of work about the shop. It is therefore good practice to adhere to one size of rivet throughout one piece of structural work.

In connecting the several members at their junctions gusset-plates are used. Where the truss is exposed, some consideration should be paid to appearance in designing these plates, and in large arched trusses the gusset-plates are sometimes so cut as to form neat panels with rounded corners. This care in design, however, causes considerable additional expense and is only employed in first-class work. Gusset-plates for small trusses may be ¼-inch in thickness, but it is best practice to use gusset-plates not less than $\frac{5}{16}$-inch, and they are seldom more than ½-inch thick. All gusset-plates should be cut neatly to size, and though they may be sheared to shape the shearing should be neatly executed, without jagged edges showing in the work.

In designing the strut-members of a structural frame the usual formulas for structural steel columns should be employed. All such struts should have an unsupported length not exceeding 45 times the least dimension. In considering compression-members it is not necessary to deduct for rivet-holes, and to use the net section, in the calculations, for when the rivets are well upset they fill the hole completely and furnish any required degree of resistance to compression. The rivets connecting the ends of struts must be analyzed for shear and for bearing on the gusset-plate.

Engineering practice in some instances, dictates that all connections, including those for struts and compression-members, shall be designed to realize the full strength of the member so connected. Frequently, however, it is found convenient to use members having a great excess of strength, and the practice just proposed would, in consequence, be far from economical. At least the connection must be designed to realize the full amount of the stress obtained from the frame-diagrams, and if the riveting of the connection under consideration is to be executed in the field, the connection should be designed

so that it will have at least 25 per cent excess of strength over that required. Where struts are composed of several rolled shapes they must be securely tied together, either with separators, tie-plates or lattice-bars. If the several rolled shapes are connected with separators or tie-plates, the distance from centre to centre of separator or plate should not exceed 6 times the smallest diameter of the rolled shapes connected. Where the elements of the strut are tied together with lattice-bars, the standard spacing for such bars should be used, and in designing such members the following table will be found of use.

USUAL SPACING AND SIZE OF LATTICE BARS.

ALL DIMENSIONS IN INCHES.

Depth of Channel or Dimension of Side of Member.	Dimensions of Lattice Bars		Weight of Bars	Distance from Centre of Hole to End of Bar.	Distance from Centre to Centre of Rivets Measured Parallel with Member	
	Width.	Thickness.	Pounds.		Minimum.	Maximum.
6	1½	¼	1.28	1⅛	11¼	6⅝
7	1¾	¼	1.49	1⅛	13¼	7⅝
8	2	5/16	2.12	1¼	15	8 11/16
9	2	5/16	2.12	1¼	16¼	9⅜
10	2	⅜	2.55	1¼	18¾	10 11/16
12	2¼	⅜	2.87	1⅜	22½	13
15	2¼	⅜	3.19	1½	26½	15 5/16

Rafter members are frequently subjected not only to compressive stress, but as well to transverse stress. This occurs where secondary roof-members are supported at other positions along the rafter-members than at the panel-points. The maximum direct compressive stress to which the member is subjected can be determined from the stress-diagram, and from this the sectional-area required in the member may be calculated. The greatest transverse-stress may be calculated by the principle of moments. When the moment of inertia of the rafter-member and its section-modulus has been determined, the maximum unit-stress at the extreme fibre can then be figured, and if, when the unit compressive-stress has been added to this maximum unit transverse-stress the same does not exceed the allowable working-stress of the metal, the member may be considered as safe against failure.

In designing steel trusses consideration must be paid to the shipment size of the several parts. If the work is to be sent to a distant point by rail, it must be in such sized pieces as can be accommodated by the car and the size of the tunnels or overhead bridges along the line of the road. In shipment, thin gusset-plates if attached to the heavy members are likely to be badly bent and twisted by the time the work reaches its destination, so that it is usually better to do an additional amount of field-work than to run the chance of having difficulty with the fitting-up. All structural steel-work should be painted in the shop before shipment so that initial rust and corrosion shall be avoided. There is a great difference of opinion regarding the character of paint that should be used on structural steel-work. Experience, however, has shown pretty conclusively that for durability a mixture of red and white lead and good linseed oil is a preferable coating. All plates and angles connected in the shop should have the scale, rust or dirt removed, and be given a good coat of linseed oil; this is preferable to using heavy body-paint from the fact that the paint dries out, and being so thick is apt to scale off and drop out of the connections.

In conjunction with the design of roof-trusses it is interesting to note the conditions which must be complied with in the construction of such work in large cities. The New York building-laws having been carefully revised and being thoroughly up-to-date, are quoted herewith :

"All iron or steel trimmer-beams, headers and tail-beams shall be suitably framed and connected together, and the iron or steel girders, columns, beams, trusses and all other iron-work of all floors and roofs shall be strapped, bolted, anchored and connected together and to the walls.

"All beams framed into and supported by other beams or girders, shall be connected thereto by angles or knees of a proper size and thickness, and have sufficient bolts or rivets in both legs of each connecting angle to transmit the entire weight, or load coming on the beam to the supporting beam or girder.

"In no case shall the shearing value of the bolts or rivets or the bearing value of the connection angles exceed those given herewith :

Rolled steel, direct compression	16,000 pounds.
Steel pins and rivets, bearing	20,000 pounds.
Wrought-iron pins and rivets, bearing	15,000 pounds.
Steel web-plates, in shear	9,000 pounds.
Steel shop rivets and pins, in shear	10,000 pounds.
Steel field rivets, in shear	8,000 pounds.
Steel field bolts, in shear	7,000 pounds.
Wrought-iron web-plates, in shear	6,000 pounds.
Wrought-iron shop rivets and pins, in shear	7,500 pounds.
Wrought-iron field rivets, in shear	6,000 pounds.
Wrought-iron field bolts, in shear	5,500 pounds.

"The distance from centre to centre of a rivet-hole to the edge of the material shall be not less than ⅝ of an inch for ½-inch rivets; ⅞ of an inch for ⅝ inch rivets; 1⅛ inches for ¾-inch rivets; 1½ inches for 1 inch rivets.

"Wherever possible, however, the distance shall be equal to 2 diameters. All rivets, wherever practicable, shall be machine-driven. The rivets in connection shall be proportioned and placed to suit the stresses. The pitch of rivets shall never be less than 3 diameters of the rivet, nor more than 6 inches. In the direction of the stress it shall not exceed 16 times the least thickness of the outside member.

"At right angles to the stress it shall not exceed thirty-two times the least thickness of the outside member. All holes shall be punched accurately, so that upon assembling a cold rivet will enter the hole without straining the material by drifting. Occasional slight errors shall be corrected by reaming. The rivets shall fill the holes completely; the heads shall be hemispherical and concentric with the axis of the rivet.

"Gussets shall be provided wherever required, of sufficient thickness and size to accommodate the number of rivets necessary to make a connection.

"Where riveting is not made mandatory, connections may be effected by bolts. These bolts shall be of wrought-iron or mild steel and they shall have United States Standard threads. The threads shall be full and clean, the nut shall be truly concentric with the bolt, and the thread shall be of sufficient length to allow the nut to be screwed up tightly. When bolts go through level flanges, bevel washers to match shall be used so that head and nut of bolt are parallel.

"When bolts are used for suspenders, the working-stresses shall be reduced for wrought-iron to 10,000 pounds, and for steel to 14,000 pounds per square inch of net area, and the load shall be transmitted to the head or nut by strong washers distributing the pressure evenly over the entire surface of the same. Turned bolts in reamed holes shall be deemed a substitute for field rivets.

"Trusses shall be of such design that the stresses in each member can be calculated. All trusses shall be held rigidly in position by efficient systems of lateral and sway bracing, struts being spaced so that the maximum limit of strength to least radius of gyration of the parts connected does not exceed forty. In considering the length, the distance between the nearest rivets of two stay-plates shall be considered.

"For tension members of riveted steel and wrought-iron trusses the actual net area only, after deducting rivet-holes, ⅛ inch larger than the rivets, shall be considered as resisting the stress. If tension-members are made of angle-irons riveted through one flange only, only that flange shall be considered in proportioning areas. Rivets to be proportioned as prescribed heretofore.

"If the axis of two adjoining web members do not intersect within the line of the chords, sufficient area shall be added to the chord to take up the bending-strains. No bolts shall be used in the connections of riveted trusses, excepting when riveting is impracticable, and then the holes shall be drilled or reamed.

"The bending-stresses on pins, in pin-connected trusses, shall be limited to 20,000 pounds for steel and 15,000 pounds for iron. All compression members in pin-connected trusses shall be proportioned, using 75 per cent of the permissible working-stress for columns. The heads of all eye-bars shall be made by upsetting or forging. No weld will be allowed in the body of the bar. Steel eye-bars shall be annealed. Bars shall be straight before boring. All pin-holes shall be bored true, and at right angles to the axis of the members, and must fit the pin within $\frac{1}{50}$ of an inch. The distances of pin-holes from centre to centre for corresponding members shall be alike, so that, when piled one upon another, pins will pass through both ends without forcing. Eyes and screw ends shall be so proportioned that upon test to destruction, fracture will take place in the body of the member. All pins shall be accurately turned. Pin-plates shall be provided wherever necessary to reduce the stresses on pins to the working-stresses given, as follows : —

Rolled steel pins, rivets and bolts, for bending	20,000 pounds.
Rolled wrought-iron pins, rivets and bolts, for bending	15,000 pounds.

"These pin-plates shall be connected to the members by rivets of sufficient size and number to transmit the stresses without exceeding working-stresses.

"All rivets in members of pin-connected trusses shall be machine-driven. All rivets in pin-plates which are necessary to transmit stress shall be also machine-driven. The main connections of members shall be made by pins. Other connections may be made by bolts.

"If there is a combination of rivetted and pin-connected members in one truss, these members shall comply with the requirements for pin-connected trusses; but the riveting shall comply with the following requirements.

"For tension members the actual net area only, after deducting rivet-holes ⅛ inch larger than the rivets, shall be considered as resisting the stress. If the members are made of angle-irons riveted through one flange only, the flange shall be considered in proportioning the areas.

"If the axes of two adjoining web members do not intersect with the line of the chords, sufficient area shall be added to the chord to take the bending-strains. No bolts shall be used in the connections of riveted trusses excepting when riveting is impracticable, and then the holes shall be drilled or reamed."

In order to more clearly explain the principle and methods employed in the design of details for roof-trusses, the problem illustrated in Figure 127 [See Illustrations] will be discussed. This frame consists of an A-shaped truss, supporting purlins at several points along

the rafter-member, and carrying an attic-floor load on the tie member, which is composed of two 12-inch 20-pound channels.

The member marked A is in tension, while B is a strut which is subjected to compression. The rafter-member C sustains not only considerable compression, but is likewise subjected to transverse-stress from the purlin-loads. In the tie-member D is created both tension and transverse stress, while in the leg of the truss, from the fact that it is considered that its foot is not rigidly secured to the masonry abutment or wall, there exists great transverse-stress and considerable compressive-stress. It is evident by inspection that the ratio between the resistance of the member and the bending-moment is greatest at the splice-joint marked f, and in considering the strength of the member, the section at this point must be analyzed. In discussing the problem a survey of the work will be discussed, rather than the actual design — that is, it will be considered that the truss has been constructed, and the problem is to determine the resistance of the several members.

Member A.— The maximum resistance of this tension-member is the strength of its net-section. In economical design the entire net-section of the member could be taken, but if the frame is subjected to the requirements of City Laws, it is probable that they would compel a certain percentage of reduction in the net-section, from the fact that the effort of the stress is applied axially along only one member of the angles. The sectional-area of one 2½″ × 2½″ × ⅜″ angle is 1.78 square inches, so that the gross area of the member is equal to 3.56 square inches; at no place throughout the member is there more than one rivet-hole on a line at right angles to the axis of the member; the rivets are ¾ inch in diameter, and the rivet-holes should be considered as ⅛ inch larger; the sectional-area removed from the member is therefore equal to 2 × .875 × .375 = .656 square inches. In this multiplication is included the number of rivets, which is two, the diameter of the rivet-hole, .875, and the thickness of leg of the angle through which the hole is punched, or .375. The net section of the member is equal to the gross section from which has been deducted the metal cut away, so that since the gross sectional-area is equal to 3.56, and the area cut away is equal to .656, the remaining area is equal to 2.9 square inches. Providing that a unit tensile resistance of 15,000 pounds is assumed for this member, the strength of the member will equal 2.9 × 15,000 = 43,500 pounds.

It is probable, however, that the connection of this member with the gusset-plate at the apex and in conjunction with the lower tie-member, does not realize the full strength of the member; this, however, may be determined by considering the strength of the five rivets in these connections. The rivets are evidently in double shear and web-bearing, and it remains to determine which element is the weakest. In proportioning riveted connections for bridges and buildings it is usual to allow on steel rivets 9,000 pounds for shearing and 18,000 pounds for bearing. Working on this basis, the value of the ¾-inch rivet in double shear, and a unit shearing stress of 9,000 pounds, is equal to 3,970 × 2 = 7,940 pounds. For a bearing of 18,000 a ⅜-inch plate, which is the thickness of the gusset-plate, is equal, for a ¾-inch diameter rivet, to 5,050 pounds; it is evident, therefore, that the rivets in double shear are somewhat in excess of the allowable bearing value for the gusset-plate, so that the latter value of 5,050 pounds will be employed; there are five rivets, and in consequence the allowable strength of the connection is equal to 5,050 pounds × 5 = 25,250 pounds. Throughout the practice of steel-construction it is constantly in evidence that the judgment of the designer and his individuality greatly influence the design. Some would consider an allowable unit-stress for the metal in this tension-member at 18,000 pounds, and would likewise take the bearing value of the gusset-plate considerably higher, from the fact that it is in web-bearing. On the other hand some would be more conservative and use much smaller working-stresses.

Member B.— By inspection of this member it is known that its connections are not adequate to provide a resistance equal to the allowable strength of the member, from the fact that the member is composed of two heavy angles, back to back, and is of comparatively short length. Referring to the following table, it may be ascertained that a compression-member composed of two 4″ x 4″ x $\frac{5}{16}$″ angles 8 feet long will safely sustain 23 tons, or 46,000 pounds.

The values in this table for columns under 30 radii of gyration have been calculated from a unit-stress of 12,000 pounds; for columns over 30 radii of gyration in length the following formula has been employed: —

$$s = 13{,}500 - 50\,\frac{l}{r}.$$

In this formula s equals the allowable unit-stress for the section of the member, l equals the length of the column in inches, and r equals the least radius of gyration for the combined section. The value of 23 tons selected from the table for a column having an

SAFE LOADS IN TONS FOR STEEL ANGLES USED AS STRUTS OR COLUMNS, PLACED BACK TO BACK ½ INCH APART.

EQUAL LEGS.

Size of Angles, in inches.	Thickness of Angles, inches.	Least Radius of Gyration, inches.	Area of Section, sq. inches.	Unsupported length of Column, in feet. 2	3	4	5	6	8	10	12	14	16	18	20	22	24
6 × 6	7/8	1.87	20.06				119	116	109	103	96 6	90.2	83.8	77 4	71.0	64.6	58.2
6 × 6	3/8	1.88	8.72				51.9	50.5	47.7	45.0	42.2	39 4	36.6	33.8	31.0	28.2	25.4
5 × 5	3/4	1.55	14.22			85 0	82.2	79.5	74 0	68 5	63 0	57.4	51.9	46.4	40.9		
5 × 5	3/8	1 56	7 22			43.2	41.9	40 5	37.7	34 9	32 1	29.3	26 6	23.8	21.0		
4 × 4	13/16	1.24	12.22		73 3	70.7	67.8	64.9	59.0	53.0	47.1	41.1	35.2				
4 × 4	5/16	1.24	4.80		28.8	27.7	26.6	25.4	23.1	20.8	18.4	16.1	13 8				
3½ × 3½	5/8	1.04	7.96		46.9	44.4	42.2	39.9	35 3	30.8	26.2						
3½ × 3½	5/16	1.08	4.18		24.7	23.7	22.5	21.3	19.0	16.6	14.3						
3 × 3	5/8	.94	7.12	42.7	41.2	38 9	36.7	34.4	29 9	25.3	20 8						
3 × 3	1/4	.93	2 88	17.2	16.7	15.8	14.8	13.9	12 0	10.2	8.3						
2½ × 2½	1/2	.76	4.62	27.5	25.7	23.9	22 0	20.2	16.6	12 9							
2½ × 2½	1/4	.77	2.38	14.2	13.2	12.3	11.4	10.5	8 7	6.8							
2½ × 2½	1/2	.70	4.22	24.9	23.1	21.3	19.5	17.6	14 0								
2½ × 2½	3/16	.69	1.62	9.5	8.8	8.1	7.4	6.7	5.3								
2 × 2	1/2	.62	3.72	21.5	19.7	17.9	16.1	14.3	10.7								
2 × 2	3/16	.62	1.42	8.2	7.5	6.8	6.1	5.4	4.1								

UNEQUAL LEGS.

Size of Angles, in inches.	Thickness of Angles, inches	Least Radius of Gyration, inches.	Area of Section, sq. inches	Unsupported length of Column, in feet. 2	3	4	5	6	8	10	12	14	16	18	20	22
6 × 4	7/8	1.87	16.68				99.2	96.5	91.2	85 8	80.5	75.2	69.8	64 5	59.1	53.8
6 × 4	3/8	1.67	7.22			43.4	42.2	40.9	38.3	35 7	33.1	30.6	28.0	25.4	22.8	
5 × 3½	3/4	1.59	11.96			71.8	69.5	67.3	62.8	58.3	53.8	49.2	44.7	40.2	35 7	
5 × 3½	3/8	1.51	6.10			36.3	35.1	33 9	31.5	29.1	26.6	24.2	21.8	19.4		
5 × 3	3/4	1.42	11.36			67.1	64.7	62 3	57.5	52.7	47.8	43.0	38 2	33.4		
5 × 3	5/16	1.26	4.80		28.8	27.8	26.7	25.5	23.2	21.0	18.7	16.4	14.1			
4½ × 3	3/4	1.43	10.46		62.8	61.8	59.6	57.4	53.0	48.6	44.2	39.8	35 4			
4½ × 3	5/16	1.31	4.50		27.0	26 2	25.2	24.2	22.1	20.1	18.0	16.0	13.9			
4 × 3½	3/4	1.24	10.46		62.8	60.5	58.0	55 4	50.4	45.3	40.2	35.2	30.1			
4 × 3½	5/16	1.26	4.50		27.0	26.1	25.0	24.0	21.8	19.7	17.5	15.4	13.2			
4 × 3	5/8	1.23	7.96		47.8	46.0	44.1	42.1	38.2	34.3	30.4	26.5	22.6			
4 × 3	5/16	1.27	4.18		25.1	24.3	23.3	22.3	20.3	18.4	16 4	14.4	12.4			
3½ × 3	5/8	1.06	7.34		43.3	41.2	39.1	37.1	32.9	28.7	24.6	20.4				
3½ × 3	5/16	1.10	3.86		22.9	21.9	20.8	19.7	17.6	15.5	13.4	11.3				
3½ × 2½	9/16	1.10	6.26		37.1	35 4	33.7	32.0	28 6	25.1	21.7	18.3				
3½ × 2½	1/4	1.12	2.88		17.1	16.4	15.6	14.8	13.2	11.7	10.1	8.6				
3 × 2½	9/16	.93	5.68	34 2	32.9	31.1	29.2	27.4	23.7	20.1	16 4					
3 × 2½	1/4	.95	2.62	15.7	15.2	14.4	13.6	12.7	11.1	9.4	7.8					
3 × 2	1/2	.92	4.50	27.0	25.9	24.4	23.0	21.5	18.6	15.7	12.8					
3 × 2	1/4	.93	2.38	14.3	13.9	13 1	12.3	11.5	10.0	8.4	6.9					
2½ × 1½	5/16	.70	2.14	12.6	11.6	10.6	9.7	8.8	7.1							
2½ × 1½	3/16	.72	1.34	7.9	7.4	6.8	6.3	5 7	4.6							

unsupported length of 8 feet is evidently obtained from this formula, and to check the value the following calculation may be made: —

$$s = 13{,}500 - 50 \times \frac{96}{124} = 23.1$$

In proportioning compression-members it is not necessary to consider the net section from the fact that the strength of the member is not materially destroyed by punching for rivet-holes; in fact, in compression-members as usually constructed there is a superfluity of material at the extremes, so that cutting at these points does not effect any practical reduction of strength. The connections for this compression-member may be figured in the same manner as those for the tension-member marked A. Each rivet may be considered as having a bearing value upon the $\frac{3}{8}$-inch gusset-plate at the foot of the member and the web-plate of similar thickness at the top, of 5,050 pounds. There being four rivets, it is evident that the strength of the connection is only 20,000 pounds, or 5 tons, while the member is capable of carrying at least 23 tons.

Member C. — The next member to consider is that marked C, which is the rafter-member of the frame. This member is composed of two $3\frac{1}{2}'' \times 3\frac{1}{2}'' \times \frac{3}{8}''$ angles placed back to back along one edge of the $10'' \times \frac{3}{8}''$ web-plate. Not only is this member subjected to direct compressive stress, but from the fact that the purlins are located at other positions than the panel points it must sustain considerable transverse stress. Upon deciding the amount of direct compressive stress this member will safely carry, it is necessary to determine the extreme fibre-stress produced by the transverse loads. In order to determine this stress the loads upon the truss should be investigated. The reactions from the ends of the purlins consist of those due to the vertical loads, which is the weight of the roofing material, and the normal loads, or those due to the wind-pressure upon the roof. The trusses are considered as being spaced 12 feet from centre to centre, and, in consequence, the area supported by the purlin at g will, according to information given in Figure 127, equal $4.375 \times 12 = 52.5$ square feet, while the area of roof supported at the point h is equal to $4.75 \times 12 = 57$ square feet. It is considered that the effective vertical load due to the weight of the roofing materials is equal to 25 pounds per square foot of surface on the slope, so that the vertical load at the point g will equal $52.5 \times 25 = 1{,}312$ pounds, while the load supported at the point H will equal $57 \times 25 = 1{,}425$ pounds. These two results may, for convenience in figuring, be taken respectively at 1,400 and 1,500 pounds. The wind-loads sustained at the points g and h, which are calculated for the same areas and for a pressure of 30 pounds per square foot, are equal respectively to 1,575 pounds and 1,710 pounds, which for convenience may be increased to 1,600 and 1,800 pounds. To determine the greatest bending-moment upon the upper portion of the rafter-member between points x and x_1, it is advisable to calculate the reactions at the point i for both the vertical and normal loads, to figure separately the bending-moment for each of those loads, and to determine the maximum moment by taking their sum. A diagrammatical representation of the loads upon the upper portion of the rafter-member is shown at (a) and (b) in Figure 128. At (a) is shown a diagram for the vertical loads, all dimensions being horizontal measurements, while at (b) is shown a diagram for the wind-loads, or the forces acting normal to the slope of the roof. The dimensions in this diagram are taken parallel with the slope of the roof. It is now required to calculate in each case the right-hand reaction; considering the diagram at (a), the tabulation will be as follows: —

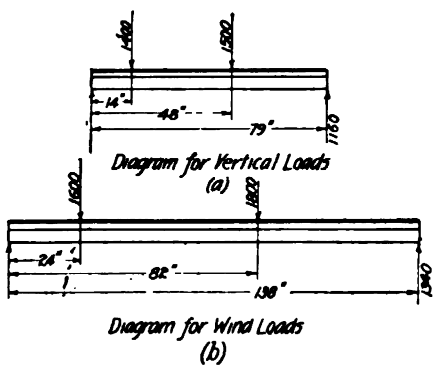


Fig. 128.

$$\begin{aligned}
&\text{Moment for vertical load } g = 1{,}400 \times 14 = 19{,}600 \text{ inch-pounds}\\
&\text{Moment for vertical load } h = 1{,}500 \times 48 = 72{,}000 \text{ inch-pounds}\\
&\qquad\quad \text{Total moment} \;\ldots\ldots\ldots = \overline{91{,}600} \text{ inch-pounds}
\end{aligned}$$

The right-hand reaction will, in consequence, be found by dividing $91{,}600 \times 79$, which gives 1,160 pounds, or the amount of the reaction at i due to the dead or vertical load upon the upper portion of the rafter member. Considering the diagram marked (b), the calculations are as follows: —

$$\begin{aligned}
&\text{Moment for wind load } g = 1{,}600 \times 24 = 38{,}400 \text{ inch-pounds}\\
&\text{Moment for wind load } h = 1{,}800 \times 82 = 147{,}600 \text{ inch-pounds}\\
&\qquad\quad \text{Total moment} \ldots\ldots\ldots\ldots = \overline{186{,}000} \text{ inch-pounds}
\end{aligned}$$

and the reaction at the right equals $186{,}000 \div 138 = 1{,}340$ pounds. The bending-moment at the point h in each case may now be determined by multiplying the amount of each of the reactions just determined by their respective distances from the right-hand end of the rafter-member to the point h. The bending-moment due to the dead-load is equal to $1{,}160 \times 31 = 35{,}960$ inch-pounds, while the bending-moment due to the wind-load is equal to $1{,}340 \times 56 = 75{,}040$ inch-pounds; the total bending-moment existing at the point h is equal to the sum of these two moments, or $75{,}040 + 35{,}960$, which gives 111,000 inch-pounds, this being the greatest bending-moment upon the upper portion of the rafter-member. In considering this bending-moment the rafter-member was not considered as a continuous beam, for in the design of all framed structures it is necessary to assume that the several panel points or connections throughout the frame are hinged, or pin-connected; therefore in considering the upper portion of the rafter-member as a simple beam, and thus disregarding its continuity from the heel of the truss to the apex, any results that might be determined will tend towards a greater factor of safety. This is readily explained by the fact that a continuous beam possesses greater resistance than a number of simple beams having combined the same span.

Now that the greatest bending-moment has been found, it is next required that the resistance of the section shall be calculated. A diagram of the section is given in Figure 129 and it is necessary to determine its properties, that is, the location of the neutral axis, the moment of inertia, the section modulus and the radius of gyration. The location of the neutral axis is found by dividing by the total area of the section the sum of the moments obtained by multiplying the area of each element of the section by the distance from its centre of gravity to the line of origin of moments. The distance from the centre of gravity of the two angles to the line of origin of moments is 1 inch, and the distance from the centre of gravity of the web-plate to the same line is 5 inches; the area of each angle is 2.53 square inches, while the area of the web-plate is 3.75 square inches. The calculation for the moments may then be arranged as follows: —

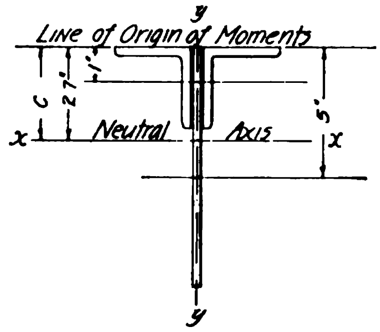


Fig. 129.

$$\begin{aligned}
&\text{Two angles} = 2.53 \times 2 \times 1 = 5.06\\
&\text{One plate} \;\; = 3.75 \times 5 \qquad = 18.75\\
&\quad \text{Sum of moments} \ldots\ldots = \overline{23.81}
\end{aligned}$$

The total area of the section is 8.81 square inches and the total moment, as obtained, is 23.81, so that the distance c is equal to $23.81 \div 8.81 = 2.7$ inches. The formula for calculating the moment of inertia is $I = \Sigma\, a\, d^2 + i$; in this formula a equals the area of each elementary section; d equals the distance from the centre of gravity of the section to the neutral axis, and i equals the moment of inertia of the section; the calculation for the section shown will then be as follows: —

$$\begin{aligned}
&\text{Two angles} = 5.06 \times 1.7^2 + 6 = 20.62\\
&\text{One plate} \;\; = 3.75 \times 2.3^2 + 31.2 = 51.03\\
&\quad \text{Moment of inertia of section} = \overline{71.65}
\end{aligned}$$

When the moment of inertia has been found in this manner both the section modulus and the radius of gyration may readily be determined. The former may be represented by Q, and is equal to $\frac{I}{c}$, while the latter is designated by R, and equals $\sqrt{\frac{I}{A}}$. In the first formula c is the greatest distance from the neutral axis of the section to the outside fibre, which since the entire depth of the section is equal to 10 inches, and the least distance from this axis to the outside fibre is 2.7 inches, as previously found by calculation, is equal to $10 - 2.7 = 7.3$ inches. By substituting, therefore, the value and the amount of the moment of inertia or I in the formula $Q = \frac{I}{c}$, $Q = \frac{71.65}{7.3} = 9.8$, and by substituting in the other formula, or,

$R = \sqrt{\frac{I}{A}}$ the value of $R = \sqrt{\frac{71.65}{8.81}}$ or 2.83.

In all beams in equilibrium the bending-moment must equal the resisting-moment, or, as it may be expressed by a very familiar formula, $M = M_1$; consequently if $M_1 = Q\,s$, M must likewise equal $Q\,s$. By transposition of the formula $M = Q\,s$, $S = \frac{M}{Q}$, in which, as is sufficiently clear by the subject matter, M equals the maximum bending-moment existing in the upper portion of the rafter-member of the frame under consideration, which is 111,000 inch-pounds, Q equals the modulus of the section, which, as just obtained, is equal to 9.8, and s is the maximum unit-stress occurring in the extreme fibre of the section which it is desirable to find. Again substituting, therefore, $s = \frac{111{,}000}{9.8}$ or 11,300 pounds. In such a frame as this truss an allowable extreme fibre-stress of 16,000 pounds per square inch may be adopted with safety. The difference, therefore, between the allowable unit-stress and the extreme stress due to the transverse action of the purlin reactions or roof-loads, will be the amount of unit-stress allowable for the direct compressive stress exerted through this member of the frame. The unit-stress that may then be considered for the direct stress is equal to $16{,}000 - 11{,}300 = 4{,}700$ pounds.

As a compression-member the upper portion of the rafter-member

has a length greater than 30 radii of gyration, so that this stress cannot be considered for its full amount, but must be reduced in the proportion required, by the usual column formula for a strut of this length. It is permissible therefore to employ the formula $s = s_1 - 50\frac{l}{r}$, and to reduce the residuum allowable stress by the proportion of s to s_1, which is equivalent to taking a percentage of the residuum stress equal to $\frac{s_1}{s}$. The value of s_1 as given before is 13,500, and the length of the member in inches, or l, may be taken at 138, where as the purlins are considered as being securely bolted to the clips riveted to the angles of the rafter-member r, may be taken about the axis $x\,x$, Figure 129, instead of, as ordinarily, about the axis $y\,y$, which would give the least value of r. The value of r in the formula will then be taken at 2.83, while the value of s, which is found by substituting in the formula $s = s_1 - 50\frac{l}{r}$, equals 11,065; then applying the proportion $\frac{s_1}{s}$, the percentage of the residuum-stress which may be considered in determining the strength of the upper rafter-member is equal to $\frac{11,065}{13,500}$, or 82 per cent. The residuum-stress remaining after the extreme fiber-stress instituted by the transverse-stress has been deducted from the allowable unit working-stress is 6,700 pounds, and 82 per cent of this unit is 5,495 pounds. Since the sectional area of the member under consideration is 9.8 square inches, the total amount of compression allowable in the member is $5,495 \times 9.8 = 53,851$ pounds. The connections of this member at the apex and at the foot should be considered, to determine whether the vertical reactions due to the purlin-loads and the direct stresses instituted in the frame are amply provided for by the shearing and bearing values of the rivets.

As previously stated, the weakest point in the leg of the truss is probably at F, for around this point there exists the greatest moments due to the vertical-load and wind reactions. The leverage of these forces about a point higher up on the member is greater, but the depth of the member is increased in a far greater ratio, so that the section modulus, in proportion to the bending-moment, is greater.

Referring to Figure 130, it is observed that the right-hand leg of the truss, under the conditions of loading shown in the diagram, is subjected to bending moment by the reaction R_1 acting with the lever-arm x, while R_2 acts about the same point with a lever-arm of y. At this point, however, the greatest moment may not exist, for reference to the right-hand foot of the truss reveals the fact that while the reaction R_2 is of the same amount, and acts with the same lever-arm as R_1, the reaction R_4 is greatly increased, though its lever arm is not as great as at the right-hand foot of the truss. It is necessary, therefore, to determine the amount of the greatest bending-moment, and then adopting an allowable unit-stress, determine the section modulus required. When this has been done, and the member proportioned for the transverse-stress, sufficient material must be added by thickening the rolled shapes or by providing additional flange plates in order to provide resistance for the direct compressive-stress. In a truss of this character the strength of the legs of the truss is greatly increased, and the stresses throughout the truss diminished by providing horizontal thrusts at the foot of the truss. This is accomplished by the use of heavy walls, and anchor-bolts through the foot of the truss, secured into the stonework. The tie-member supports, besides a direct tensile-stress, a transverse-load and the greatest bending-moment for a continuous beam provided with two intermediate supports, should be calculated. From this result the section modulus required may be obtained, and the additional material added for providing the necessary tensile-resistance. In all cases where there are two stresses acting upon a member the greatest unit fibre-stress from both stresses should not exceed the allowable stress, and when the stresses are intermittent or alternating, the safe allowable unit fibre-stress should be reduced at least 25 per cent.

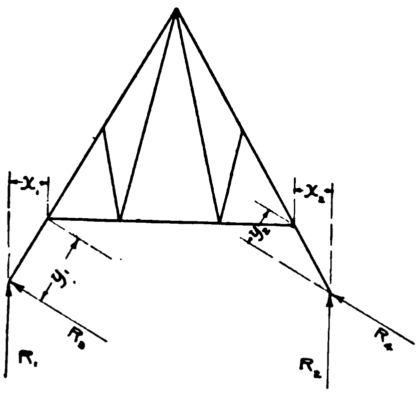


Fig. 130.

M. M. SLOAN.

[The end.]

ILLUSTRATIONS

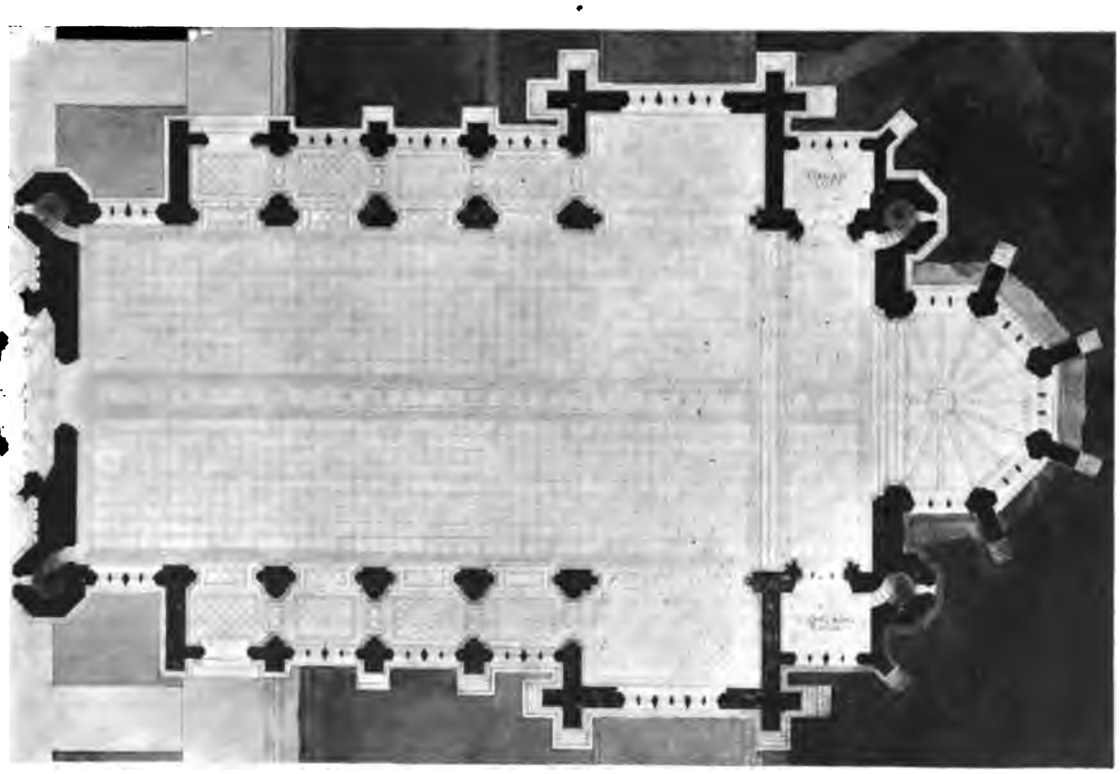
[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

STATUE OF WILLIAM ELLERY CHANNING, D.D., PUBLIC GARDEN, BOSTON, MASS. MR. HERBERT ADAMS, SCULPTOR.

SUGGESTED ALTERATIONS OF THE CITY-HALL, BRIDGEPORT, CONN. MR. J. W. NORTHROP, ARCHITECT, BRIDGEPORT, CONN.

FIG. 127: NOTES ON IRON AND STEEL CONSTRUCTION. MR. M. M. SLOAN, ENGINEER, SCRANTON, PA.

A COMPETITIVE DESIGN FOR THE NATIONAL COMMERCIAL BANK BUILDING, ALBANY, N. Y. BRUCE PRICE, ARCHITECT.



Plan of Chapel: U. S. Military Academy, West Point, N. Y. Cope & Stewardson, Architects.

Additional Illustrations in the International Edition.

MONUMENT TO WILLIAM ELLERY CHANNING, D.D., BOSTON, MASS. MR. HERBERT ADAMS, SCULPTOR; MR. V. C. GRIFFITH, ARCHITECT.

COMPETITIVE DESIGN FOR CHAPEL: U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. FROST & GRANGER, ARCHITECTS, CHICAGO, ILL.: TWO PLATES.

COMPETITIVE DESIGN FOR CHAPEL: U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.: DOUBLE PLATE.

NOTES & CLIPPINGS

WHISTLER'S QUARRELSOMENESS. — The quarrelsomeness of Whistler began with a combination of nervous fastidiousness and temperamental gayety of disposition. That spring, that elasticity of mind which kept his hand so full of craftsmanship was the source of his eternal youth, his quips and cranks and love of teasing. In time the habit became fixed and Whistler developed a Mephistophelean dexterity in touching the raw, ever losing thereby one friend after another. Like the dog that has a reputation for biting, the genial master made a desert about his den, but consoled himself with noting how efficacious this reputation was in holding off bores. The slow and ponderous nature of some of our British cousins lured him on, until what had been at first amusing made very often a close approach to tediousness. The ready applause won by Whistler's bright, stiletto-like remarks engaged him inevitably in the blind alley where a clever talker is found to talk too much — about himself. All this was mere surface. Underneath was a deep and discerning mind making play with peacock rooms and butterfly signatures to baffle and irritate those who could not understand. It will always be remembered that he was the greatest etcher of his age and the most profound colorist. He led the way from the easel to the decoration of interiors, brushing aside the absurd idea that painters of the easel picture form a superior caste. — *N. Y. Times.*

LITTLE ELECTROLYSIS IN PHILADELPHIA. — At the recent annual convention of the American Waterworks Association at Detroit Mr. Rowe said that there is no electrolysis in Philadelphia. In that city there are some 27,000 man-holes along the conduits that carry the large cables of the street railways back to the negative buss-bars of their dynamos at their eight or ten power-stations. The city electrician stated that, whenever his department found a difference of potential between the pipes and the rails they would immediately notify the manager of the car company who would rebond the rails or make some changes in them to take off this current. Where there is a difference of potential there must be some current, and this is a condition that must be remedied, even if it is necessary to open up the street and make another conduit connection from the large cables to the rail. But even in Philadelphia, with all these additional precautions, current is going on to the pipe; so that the aërial metallic circuit is possibly the only means which is entirely reliable. The argument in the Dayton suit has just been closed in the appeal to the Circuit court, and it is now submitted to that court. There are some cities that say they have not got electrolysis, and there may be more politics in that city than necessary; but, if they have the single trolley system, unquestionably it is only a matter of time until they will have to cope with electrolysis, and when that sets in simply cleaning out the pipe will not suffice. In a 6-inch line that burst at Dayton last year, the iron had been removed, and had left something like a plug of carbon 2 inches to 2¼ inches in diameter. When that plug was taken out, it exposed a hole there like a flicker's hole in a telegraph pole. The superintendent had cut out about 4 or 5 feet of pipe to replace pipe where it had burst. He cut it out at the bell end and put on a sleeve at the other. When he went to caulk the pipe or cut off the gate lid, the chisel went right through that pipe into the other side, and there was a soft spot there which you could not have detected. You could not see anything wrong, yet that was so soft that the chisel went right through it and he had to cut it off to get the chisel out. On the under side of the pipe where the lead had been poured was noticed a suspicious appearance; he took out his penknife and just pushed the blade right through the pipe almost as easy as through a piece of cheese; the pipe did not burst at that place; probably the earth held the carbon in place till the pressure on the inside got a certain amount of purchase on it, and then it blew out. So, where there is a single trolley in existence in any city, whenever the pipe is exposed for any purpose, especially along the electric lines, they could not be too careful in examining that pipe either for tapping or making some side street connection. It was very important all the time to make a close inspection and not wait until the pipes begin to burst before attention is given to them. Mr. Knudson said it took about four years, with a difference of potential of four or five volts, other conditions of course being favorable, to destroy a pipe. In Philadelphia the electrical bureau has power to compel the railway company to put down such an amount of copper as they pleased. In that way they have received a very fine return for the railway current. That is the main reason why the city of Philadelphia is so well equipped for returning the current and shows so little damage upon the lines at the present time. At the same time there is more or less electrolysis going on in Philadelphia. He had himself seen in one case service pipe burst on that account. He made the test and found the conditions favorable for that very thing. So that city is not entirely exempt, although the conditions there probably are the best in the United States owing to the fact that railway companies are compelled by the electrical bureau to put down a large return copper feeder in conduits. — *Exchange.*

HOW AN OLD VIRGINIA CLOCK WAS PAID FOR. — Perhaps no clock in America has a more interesting story than the one in the steeple of the City-hall and market-house at Alexandria, Va. Back in the days before the war Alexandria was one of the Southern cities which was known as a pretty rapid place for the sporting fraternity, but in those days it was a square game, and no cheating — a gentleman's game from start to finish. On one occasion the town had been visited by several gamblers from the Southwest who had come hither "seeking whom they might devour." At length a respectable citizen, who occasionally took a flyer with cards, fell into a snare which was set for him, and after a series of games, carried on on different nights, he found himself fleeced out of something like $2,500. As a "true Southerner" he had to make good, and this he did without bickering, but with the determination to get even. He was too honorable not to stand the hazard of the die. A lucky thought enabled him to bring about his revenge on the blackleg. He had knowledge that there was an old law in Virginia — and a similar law is now on the statute books — established while she was yet a colony, in which it was "made and provided" that if any man could not show that he was pursuing some "lawful means of obtaining a livelihood" he should be sold or hired out at auction to prevent, by his labor, his becoming chargeable to the town. Going before a justice of the peace he immediately entered complaint against the gamester. The man was arrested, tried and condemned to be sold at auction. Here was a dilemma. The gambler was at first disposed to treat the whole matter as a joke. But he soon found out his mistake. He was taken to a public stand, "put up" for sale, and the bidding began — the sale "peremptory." His victim started the bid with "one hundred dollars." "Two hundred," said the blackleg. And so the gambler and his victim went on bidding until the amount reached $2,000, when the former begged to be let off, pleading poverty, but all his pleadings would not cause the cheated man to relinquish his determination to make him pay dear for what he had done. There was no alternative, the gambler must either be forced into a service of degrading labor, under the supervision of a man who had small cause to love him, or he must go on bidding for himself, which he was actually compelled to do until the sum had reached $3,500, when he was permitted to pay over the amount and depart from the town, a crowd of hooting, yelling men and boys following him to the wharf, where he took the steamer. The citizen then gave the proceeds of the "man sale" to the city to be used in putting up a clock and steeple on the town-hall and market-house, which building was torn down a few years ago to make room for a larger and more modern structure. Not a great many of the citizens know the history of the old steeple and clock, but Capt. Edward Dangerfield told the Building Committee that he was particularly desirous of seeing the steeple and clock preserved and that he wished to defray all expense of having the clock repaired and "modernized" for the new building. This proposition was accepted and to-day the people of the good old city have practically the same steeple and clock their old-time citizen made a gambler pay for. — *Richmond Times-Despatch.*

ELECTROLYSIS OF A BIG PIPE. — As a result of the bursting of a six-inch water-main in the Brooklyn Navy Yard an investigation is being made by the authorities there to determine whether electricity escaping from the wires of the Brooklyn Rapid Transit Company is responsible for the corrosion of pipes in the yard. It is said that if this theory is found to be correct a suit for damages may be brought against the railroad company by the Government. Engineers at the yard believe that the corroded condition of the many water and other pipes laid there is due to electrolysis. The theory is that a part of the heavy electric current concentrated at the Brooklyn terminal of the Brooklyn Bridge escapes from the wires and finds its way back to the power-house on Kent Avenue, Williamsburg, passing through the navy yard, where the water pipes act as conductors. It is asserted that the escape of much of this electricity could be prevented by the use of improved appliances. There have been several investigations of this matter from time to time, but nothing has come of any of them. The present investigation is being conducted by the Chief of the Yards and Docks Department. — *N. Y. Times.*

THE END OF PULLMAN. — It was nearly five years ago that the Supreme Court of Illinois decided that the Pullman Palace Car Company was holding land for other than purely corporate purposes contrary to law, and ordered the company to dispose of its holdings before the end of October of this year. This order compelled the sale of about 4,000 acres underlying the model town of Pullman, together with the many buildings owned by the company and rented to employés or devoted to other uses than the manufacturing of cars. Very little of the land has so far been sold, but there is no intention of evading the order of the court, and much of the town of Pullman will be forced through the Chicago real-estate market within a short time, where it is certain to bring high prices. This will doubtless mean an extra division of profits on the company's stock. Such is the end of Mr. Pullman's fond plan of settling the labor problem. He acted sincerely, but mistakenly, for instead of improving the relations of labor and capital the town of Pullman scheme was instrumental in bringing on one of the sharpest conflicts between the two factors in production ever known. Out of that strike of 1894 grew the legal proceedings which ended in securing against the company an order of sale of the model town. — *Springfield Republican.*

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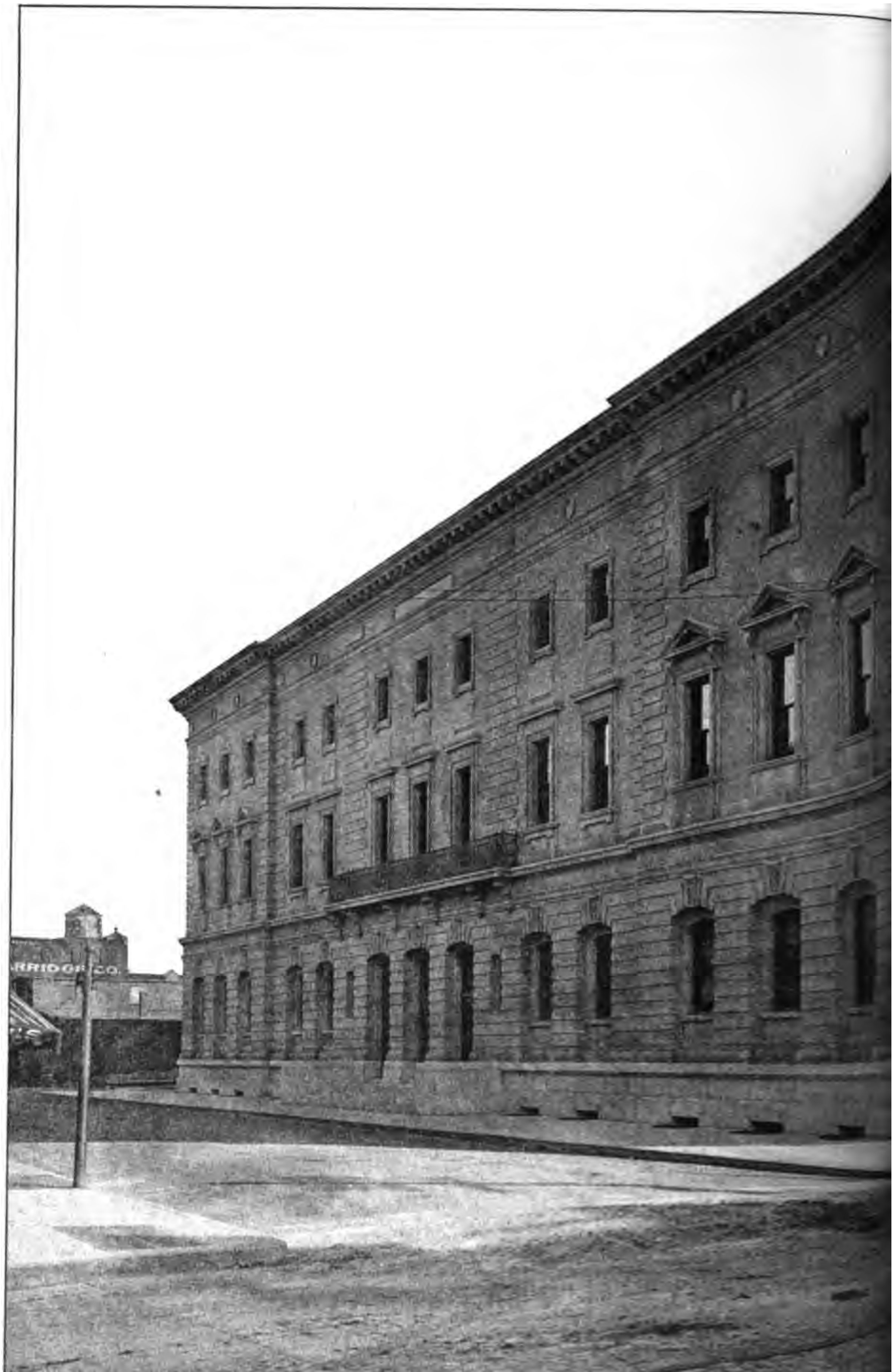

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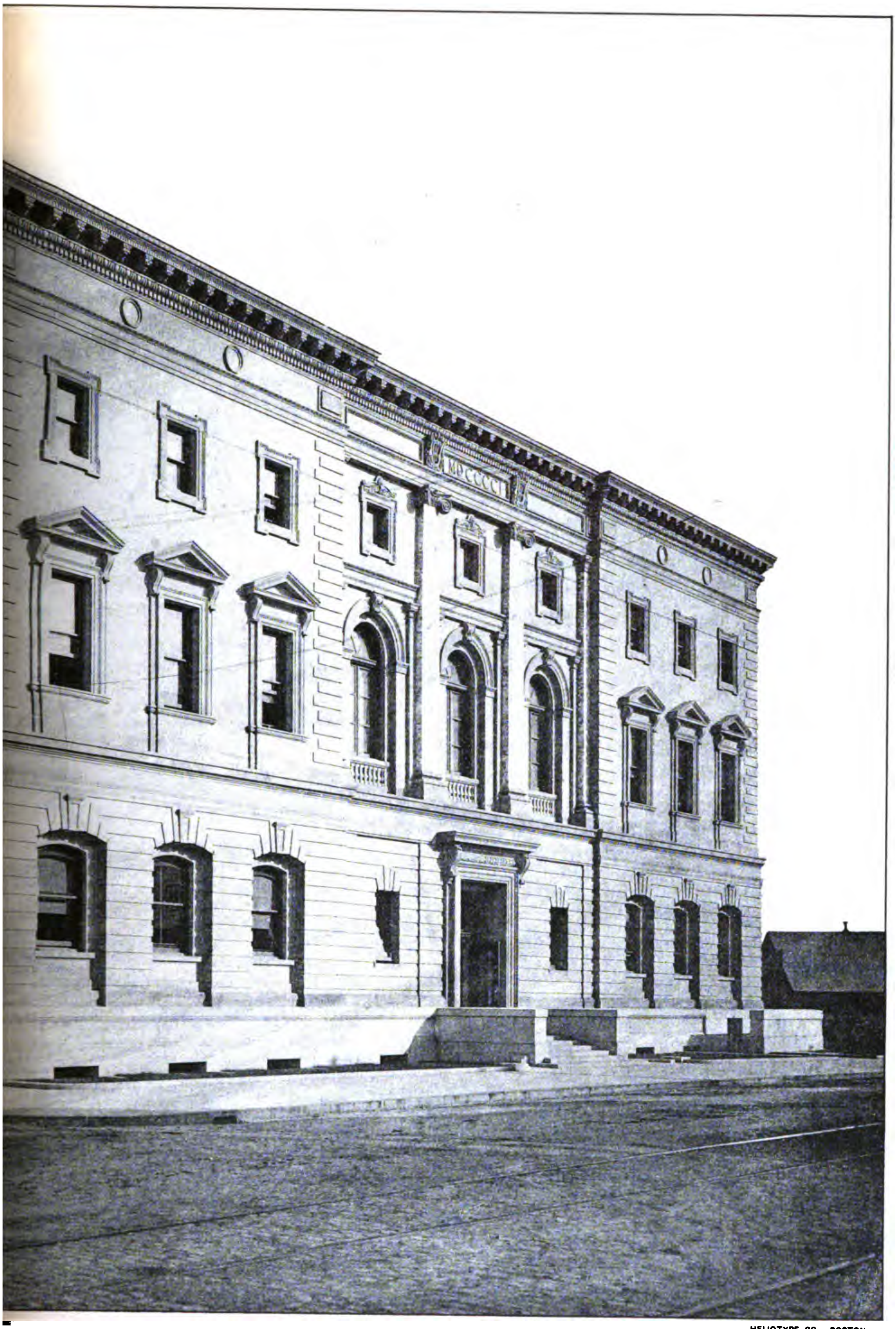

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:Y OF MUSIC, BOSTON, MASS.

:N, ARCHITECTS.

The American Architect
Sept. 5, 1903.
No. 1445.

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No. 6, East 62D Street.

No. 8, East 62D Street.

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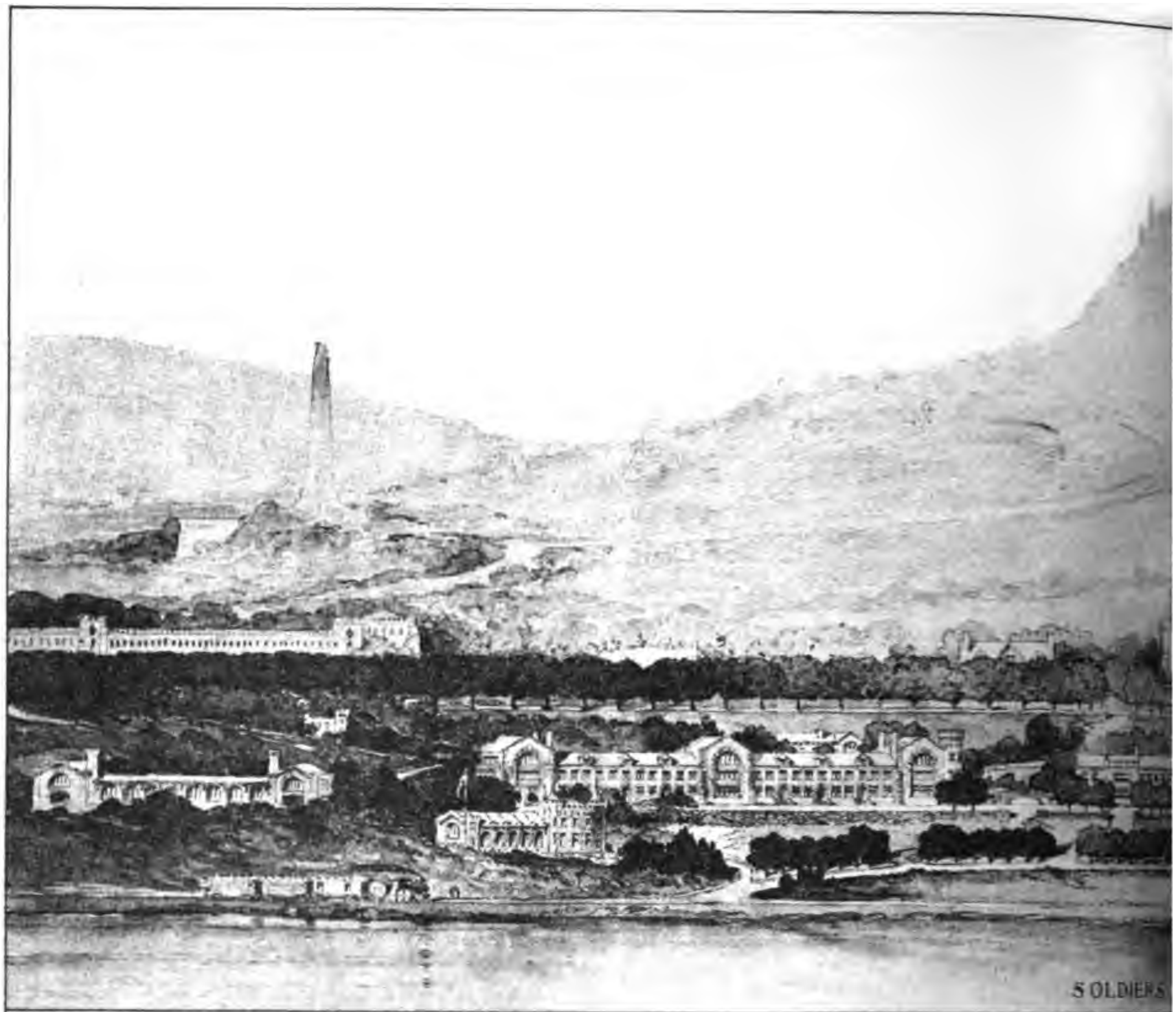

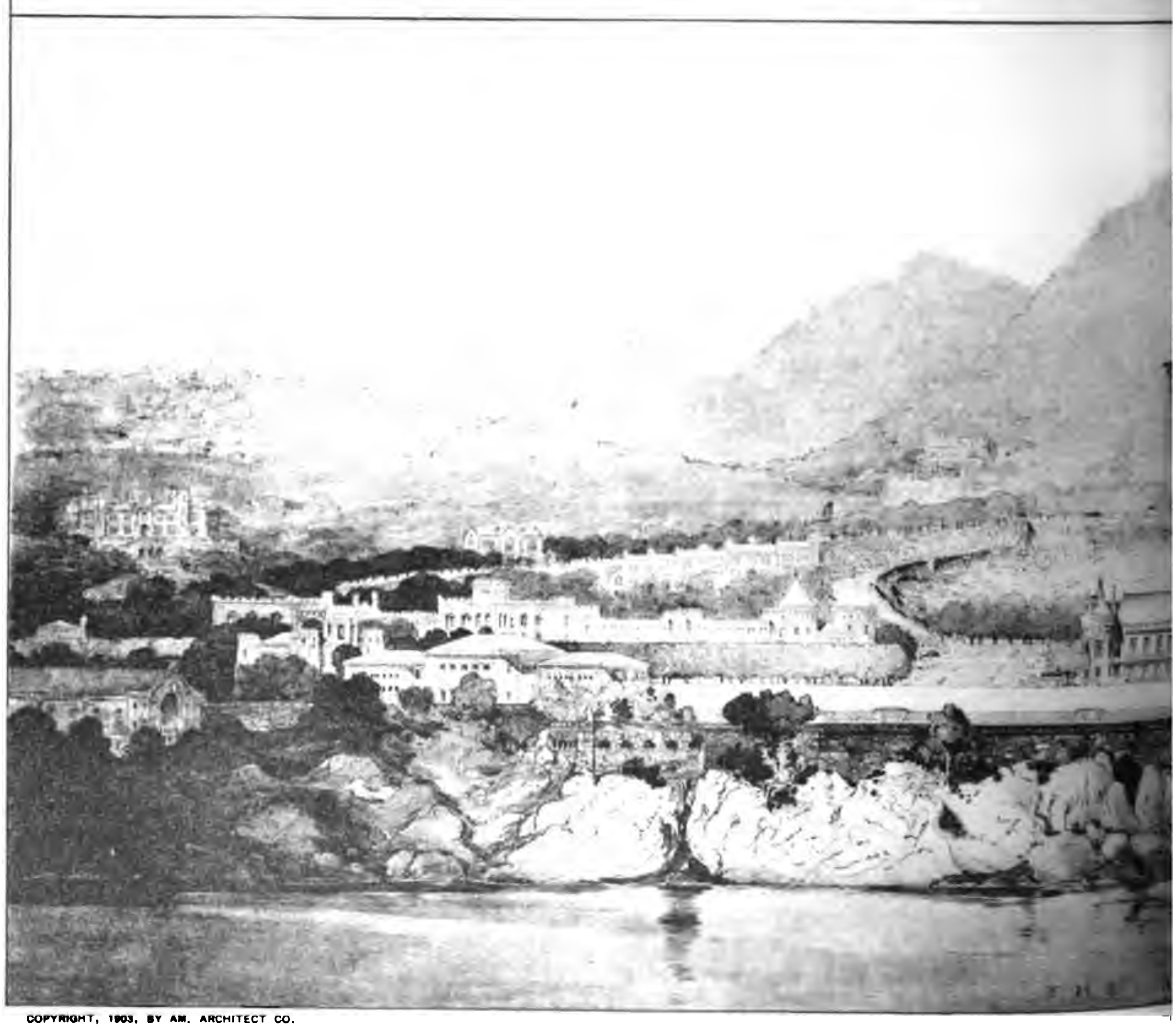

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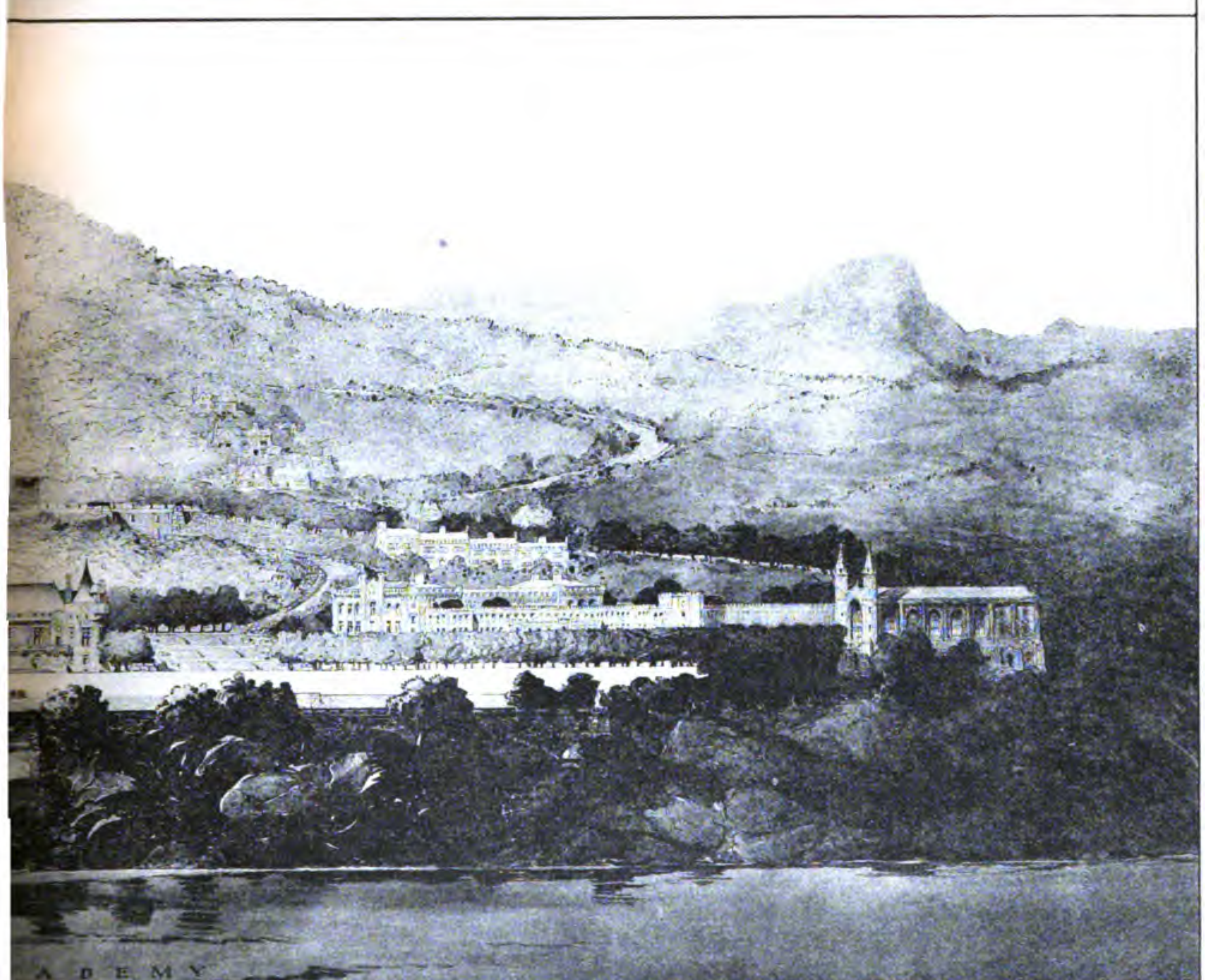

HELIOTYPE CO., BOSTON.

THE U. S. MILITARY ACADEMY, WEST POINT, N. Y.

, ARCHITECTS.

The American Architect
Sept. 5, 1903.
No. 1445.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI SATURDAY, SEPTEMBER 5, 1903 No. 1445

CONTENTS

IN the death of Mr. Frederick Law Olmsted this country has lost not only a great artist, but the pioneer, we might almost say, in the great American art of landscape-gardening. We are so accustomed to the magnificent parks which now adorn every American city of importance that it is hard to realize that when the quiet and studious Connecticut farmer, known to the public only as a writer of books on agricultural matters and methods, was invited to take charge of the laying-out of the proposed Central Park, in New York, Boston Common was the largest public park in America. Even in Europe, although parks existed, they were mostly palace gardens, opened by courtesy to the public, like the Luxembourg and Tuileries Gardens, in Paris, or vast, uncared-for spaces, available for fresh air, but with little pretension to artistic effect. In the Central Park Mr. Olmsted found a tract two miles long, and half a mile wide, diversified with hills and valleys, meadows and pastures, rocks and streams, uninviting enough in its actual condition, but presenting to the artist an opportunity which he seized with enthusiasm. Every one knows what use he made of it. We have been at various times familiar with many parks, but none that we have seen compares in poetical sentiment with the New York Central Park. The nearest approach to it is, perhaps, to be found in the Boston Fens, also, in its conception, Mr. Olmsted's work; but the Fens landscape is not yet matured by the growth of the trees, and it still lacks the contrast of architectural formality which is made, with such exquisite skill, to enhance the natural beauties of the Central Park.

THE public was not slow to appreciate the revelation of a new art which the New York park afforded, and Mr. Olmsted was soon called upon to design a great park for the sister city of Brooklyn. The plans were made, and carried out in their essential features, when his connection with metropolitan improvements terminated, as the result of an incident which he has himself described to us. One day, when he was in his office, busy over his work on the Brooklyn park, a stranger made his appearance, and handed him a letter from a noted local politician, directing him to give the bearer a position in the Park, at five dollars a day. Mr. Olmsted, willing to oblige the magnate, questioned the man, and, finding him grossly ignorant and incapable, assigned him a place as a laborer, at a laborer's wages. The man went back indignantly to his patron, and soon returned with a peremptory demand for a position at five dollars a day. Mr. Olmsted, who, though gentleness personified in manner, was firm enough in what he regarded as his duty, sent back word that the man was not fit for anything but a laborer's work, and that he could not conscientiously give him a more responsible position. The politician was furious, and vowed that he would get Mr. Olmsted out of the Park. Whether he succeeded in having him called upon to resign, or whether he only managed to make his position so disagreeable that he resigned voluntarily, we do not know; but, not long afterwards, he severed his official connection with the Brooklyn park system, and removed to Massachusetts, where, in his house in Brookline, and with the aid of assistants, among whom have been, at various times, his two sons, the late Charles Eliot, and other men of great skill and talent, have been planned most of the great park systems of the country.

MR. PARKS has, at the request of his counsel, been sentenced to State prison for three years, as the result of his conviction for extorting two hundred dollars from Josephus Plenty, of Hoboken, the well-known horticultural builder, through threats of a strike. It is not usual for lawyers to insist on having their clients sent to prison; but, in this case, it is said that three other indictments have been found against Parks for similar offenses, besides a probability that five more will be added to the list when the evidence is in shape for presentation to the grand jury, and his counsel is presumed to have thought that his immediate seclusion would make it more difficult to try him for the other cases. Meanwhile, a prominent union man, who had been a leader in the opposition to Parks, was found dead in the street one morning this week. He had complained to his friends that he was being followed, and it is not impossible that, if the matter were taken up in earnest, his violent death, like that of so many other men, might be traced to the "champions of labor."

LABOR matters are wearing a somewhat more cheerful look in New York, although Mr. Parks has secured a stay of proceedings and has left Sing Sing on bail in the sum of $16,000. Still it is evident that his activity will be, at least, somewhat restricted until his sentence expires; and, in the meantime, large numbers of men have deserted the unions which have refused to sign the arbitration agreement, and have gone back to work. Whether the arbitration agreement will itself be very efficient remains to be seen, although its adoption is a long step in advance in the relations of employers and employed. In Chicago, where arbitration agreements have been in force for some time in many branches of industry, the decisions of arbitrators are openly repudiated by the unions and their walking-delegates if they do not happen to be satisfactory to them. Already, many of the most influential employers have decided that an arbitration agreement which only one side pretends to respect is not worth making, and will not enter into any more; while a dozen or more, who have suffered by the breach of arbitration contracts, have brought suit for damages, proposing to seek indemnity either from the union funds, or from the property of individual members of the unions. It is said that claims of this kind, aggregating more than a hundred thousand dollars, are now before the courts. The Federation of Labor has appointed a "law bureau" to defend these cases, thereby bringing itself, we should say, into further trouble. As we understand the law, even a corporation cannot, in this country, undertake to aid its members in defending themselves in the courts, and it is for this reason that the American Institute of Architects was obliged, some years ago, to abandon the idea of forming a fund to be used, like the Caisse de Defense Mutuelle, in France, in assisting members in cases where a committee of the Institute judged that injustice or oppression was intended. If a corporation cannot help its members to fight their battles, an unincorporated association can hardly do so, to say nothing of the personal liability which would be incurred by the directors of any body, incorporated or not, if they should convert the funds entrusted to them to purposes for which they were not intended. However, the judges know more than we do about the subject, and, whatever the decisions may be, the public will gain, through their effect in showing that union men, like other men, are expected to keep to their contracts, and that, if they break them, to the injury of others, they must pay the damage, whether they like to or not.

MR. JAMES MULCAHY, an architect of some fifteen years' practice, has been appointed Commissioner of Buildings for the city of Boston, replacing Mr. Montague, who has been Acting Commissioner since the resignation of Captain Damrell. Mr. Mulcahy is still a comparatively young man, being only forty-three years old, but he has carried out a large number of important buildings. The architects of Boston will take much satisfaction in the appointment of one of their own number, already so favorably known, to a position in which professional skill is of great and increasing importance; and Mr. Mulcahy's frankness and courtesy of manner will materially assist in maintaining cordial relations between him and those who are interested with him in the firm and intelligent enforcement of the building laws.

THE Boston Museum of Fine-Arts has erected on the site of its new building on the Fens an experimental structure, consisting mainly of a large movable skylight, some fifty feet above the ground, which is to be used for determining the best position, and the best lighting, for the skylight of the future picture-gallery. This proceeding is very similar to that carried out, some years ago, by the German Government, which, before constructing the new Parliament House, in Berlin, had a full-size model made, in wood and plaster, of the assembly-hall of the Parliament, as shown in the architect's designs, in order to study its acoustic qualities before carrying it into execution. Besides these experiments on the ground, the direction of the Boston Museum of Fine-Arts will endeavor to collect information on the subject from the custodians of other picture-galleries, here and in Europe, so that the new building may combine all the excellences that experience can suggest.

THE problem is not an easy one, in any case, and the collection of the Boston Museum of Fine-Arts is particularly difficult to provide for, as it contains works of such different types. At the Louvre, the pictures of the cinque cento can all be beautifully lighted in the Salon Carré, and the earlier Italian works in the Galerie de Sept Mètres, but they could hardly be transposed with advantage; and, in the same way, in the Luxembourg gallery the impressionist pictures are carefully put in a room by themselves; while, in the most modern galleries in Europe, the smaller pictures are kept apart, and are shown in a succession of "cabinets," with side light. In Boston, where the collection of pictures is not large enough to admit of much subdivision, and where dependence must always be placed to a great extent upon loan collections of very varied character, much ingenuity will be required, even with the aid of experimental data, to secure good effects. The "Turkey Pasture," for instance, charming as it is, could hardly be placed in the same room with a Daubigny or a Corot without injuring both, and Turner's "Slave Ship," though faded, could be almost transformed by proper lighting and surroundings. How to get such suitable lighting and surroundings for all the beautiful, though varied works which the Museum now possesses, without scattering them through a multitude of different and specially arranged rooms, and, at the same time, to provide favorable accommodation for the Manets, the Rousseaus and Duprés, the Rembrandts, the Sargents, the Fragonards and Riberas which are likely at any time to be precipitated at once upon the authorities of the Museum, as a loan collection, the owners of which wish it to be kept together, is a question of vital importance, for half the effect of a picture depends upon its being seen under proper conditions.

THERE are indications that wages, in the trades concerned in building, have reached their highest point, and that the tendency is now downward. Three or four weeks ago, the machinists employed by the Boston & Albany Railroad struck for a reduction of working hours from ten to nine, with the full ten hours' pay for nine hours' work. The usual bluster was indulged in, the boiler-men and others employed in the machine-shops were appealed to, and the threat was made to "paralyze" the operation of the road. The officials of the railroad took the matter calmly, and, after discussing it with the men, the latter, a day or two ago, went back to work in a body, having secured, it is true, a nine-hour day, but with only nine hours' pay instead of ten, so that their income is cut down ten per cent, while Saturday, which, before the strike, was a short day with full pay, has its pay proportioned to the work done. The outside labor champions are furious at the result, and threaten to "close the shops"; but the men employed in the shops probably know their business better than the outsiders do, and, unless some sort of terrorism is brought to bear upon them, they will probably keep at work. The strike of carpenters in Eastern Massachusetts for three dollars and a half a day, about which so much was heard three months ago, seems to have come practically to nothing, good carpenters being in plentiful supply at the old wages, although no official action has been taken.

SLOWLY, but surely, the right of men to earn a living without buying a union card of a saloon-keeper or blackmailer is beginning to find recognition in this country. The very fierceness with which the non-union "scab" is now attacked in the public prints, and before public commissions, by the "champions of labor" shows that the latter feel their power in danger. Nearly every strike this year has been settled on terms which secure the right of non-union men to work by the side of union men without objection or molestation from the latter, and the strikes which have been undertaken for the purpose of "unionizing" industrial establishments, that is, of compelling their proprietors to discharge all non-union men, and not to employ any more of them, have almost uniformly failed. The last important struggles of this kind have occurred in Pittsburgh, where the ten mills of the McKeesport Tin-plate Company and all the vast Westinghouse establishments, employing twenty thousand men, are now running on full time, notwithstanding strikes instituted against them to compel the "recognition" of the union.

THE story of the way in which the attack upon them was contrived is instructive. Both the tin-plate mills and the Westinghouse establishments have been conducted from the beginning on the most enlightened principles of care for the health and comfort of the working people, and recognition and reward of faithfulness and skill. As usually happens in such cases, they were soon marked for attack by the envious and treacherous labor element. In the manœuvres of this element the ordinary course is to obtain a foothold by blarney, before utilizing it for assault, and Mr. Shaffer, of the Amalgamated Society of Iron-workers, approached the workmen of the Tin-plate Company, out of working hours, with honeyed words, and succeeded in forming several small local unions among them. When he had enough men under his control to make him confident of being able to distress the Company, he went to the managers, and demanded that they reduce the output of their machines. As the men are paid by the piece, some of them earning ten to fifteen dollars a day, to comply with this request would be an injustice to the men, as well as to the Company, and the demand was refused. A strike of the union men in the mills was then ordered, and a hint was given to the ruffianly element by an editorial in the *Amalgamated Journal*, calling upon "Brothers" to support the "manly stand" of the McKeesport union. We all know what a "manly stand" means in union circles. Three days later, an old man of sixty, employed by the Tin-plate Company, was assaulted by union men in front of his house, and his wife, who came to his rescue with a paving-stone, was knocked down and kicked in the head by the gang. Even now, assaults are still committed on the non-union workmen, but the tin-plate mills are running to their full capacity, and the strike has utterly failed.

IN the case of the Westinghouse Company, Mr. Gompers opened the campaign by some beautiful utterances, in a letter to Mr. Westinghouse, on the "wisest and most practical course" for establishing "harmonious relations" between "enlightened employers" and their employés, at the same time complaining that representatives of the union had made "unavailing efforts" to obtain an interview with the manager of the establishment for discussing these valuable subjects. Mr. Westinghouse made inquiries, and discovered that a committee from the Machinists' Union had called on the manager, and proposed to discuss the discharge of a certain employé. The manager replied that he could not discuss this matter with outsiders, but would be happy to talk it over with the man himself, if he wished. One of the committee then announced that he was the man in question, and asked why he had been discharged. The manager told him that it was for absenting himself, without excuse, five days out of the two weeks during which his employment had continued. The man then endeavored to talk about abstract labor matters in general, but the manager declined to discuss them with him, and he withdrew, and a strike of all union men in the works was then ordered, fortunately, without serious result.

BUILDING CONSTRUCTION FROM A FIRE-BRIGADE OFFICER'S POINT-OF-VIEW.[1]

IN taking up as my subject "Building Construction from a Fire-Brigade Officer's Point-of-view," I have clearly before me the fact that most architects and builders are fully alive to the necessity of fire-resisting construction, and that legislative and local enactments make stipulations and recommendations with the view of preventing destruction by fire. Such efforts are worthy of praise; but my experience in combating fire leads me to the conclusion that what is intended as a safeguard too often becomes a danger, and what is theoretically meant for strength is found in the hour of need a source of weakness.

I do not presume to dictate, but I feel it my duty to sound a note of warning regarding certain widely spread and much cherished convictions as to fire-resisting materials employed in public buildings.

Speaking as I do under the auspices of the Fire Prevention Committee, I address myself more particularly to those who are responsible for the construction of buildings, but I appeal also to those of my colleagues who are responsible for dealing with buildings after the fire has begun its work. The question of the general arrangement or architectural planning of buildings does not enter into my argument; what I propose to deal with is the type of building usually described as being constructed entirely "fireproof," and to offer from my practical every-day experience suggestions which may perhaps induce building constructors to reconsider certain accepted theories in connection with so-called "fireproof" materials.

From the fireman's point-of-view these "fireproof" buildings have an element of danger added because of their construction, both in the way of increased risk to the fire-brigade and the destruction of property. If such buildings were to remain unoccupied and to be subject to no risk beyond the combustibility of their own non-inflammable construction, then certainly they could with propriety be described as "fireproof." But when (as is universally the case) such buildings are stored with goods readily inflammable the buildings cease to be "fireproof," for the action of the fire plays havoc with that portion of the material which is theoretically "fireproof."

Sufficient attention has not been paid to the bearing these so-called "fireproof" materials have in relation to the calorific effects of the burning materials stored in the buildings, for, after all, it is the contents rather than the structure which in a large majority of cases commence to burn, and which will continue to burn, no matter in what kind of building they are stored. Sufficient attention has also not been paid to the effect of water applied to building materials after they have been subjected to extreme heat.

How do these "fireproof" materials assist the salvage of either the buildings or their contents? Do they assist entrance with safety to those combating the fire?

On each of these points I shall endeavor to prove a negative from my own personal experience, which I feel confident is not singular but is common to the fire profession.

Materials principally considered to be "fireproof" and which are so styled by the Legislative Acts are iron, concrete and stone. The latter is particularly mentioned in most Acts as "stone or other fireproof material." We have to ask ourselves whether these materials are "fireproof"? When employed in the internal fittings of a building we may unquestionably give a decided negative to that question. My decided opinion is that the materials which meet the requirements are those which are not subject to the laws of expansion and contraction when suddenly exposed to the effects of heat. What are such materials? If we may take for our guidance the results of the tests of time we find them principally in timber, bricks, mortar and good plaster.

Floors and Ceilings. — It is the common experience of every fireman that an ordinary wood floor with a thin plaster ceiling underneath has stood the effects of a fire for probably an hour, and though burned through in places still remained in position and with sufficient stability left in the joisting to admit of the fireman passing over it in the course of his operations in extinguishing the fire. If such a floor survives the effects of fire with its slender remains still in position, how much better would a well-constructed wood floor resist the effects of fire under similar conditions. No extraordinary precautions are necessary to construct such a floor, but I suggest that the ends of the joists should be well bedded in the walls, flooring boards of not less than 1 inch thick be well tongued together, the spaces between the joisting be filled with pugging or other deafening, the underside or ceiling coated with 1 inch of good plaster on wire-lath. Such a floor will resist a fire either from the top or underside sufficiently long to enable any ordinary fire-brigade plenty of time to complete their toilet before turning out and arrive in time to do some good work and prevent the floors from collapsing. Where supports are required, owing to the large superficial area of floor space, built timber supports or columns have been known to remain in position and to serve the purpose a second time after having resisted the effects of a severe fire. If these wood posts or columns are wire-lathed and coated with good plaster and treated in a manner similar to that often adopted with iron columns they would come out practically unscathed. It will perhaps be argued that this method by no means gets rid of the difficulty with large spans, where iron must of necessity be introduced, but in such cases wrought-iron columns and girders (well protected) should be used to carry wood flooring and joisting, which latter, being impervious to the effects of heat and cold, remain in position, whereas the concrete floor falls in sections and often wrecks the lower floors which would otherwise not have been affected by the fire. I have known it to be argued that the burning of a wood floor gives off so much smoke that the inmates of a building would be suffocated before being reached. To properly understand this point it is necessary to compare the results of fire on both classes of flooring. We must remember that a partly burnt but intact wood floor always affords a means of reaching the inmates, and that before the floor surface commences to burn the fire must have been very severe and the contents of the apartment would almost certainly have been involved. It frequently happens that the flooring in "fireproof" buildings begins to break away at the early stages of a fire, preventing the firemen entering to attack it, with the result that the operations must necessarily be conducted from the outside, thus giving the fire a chance to make some headway. On the other hand when the water can be got onto the wood floor and supports, there is the possibility of keeping the floor intact.

I will specify a few instances in support of my contentions. The first instance is that of a fire on a carriage-builder's premises of five floors, which were built upon fireproof principles, the floors consisting of transverse 24-inch plated girders and floors of 9 inches of concrete, without protection on either side. The fire commenced in the paint-shop on the ground floor (a chamber built expressly for the purpose and having no communication with the upper floors). Upon the arrival of the brigade it was possible to see that one end each of the first and second floors was gone, and that the vehicles on the third floor were alight. The upper windows were blown out, and immediately the cold air and water got onto the third floor; the whole of this floor went down by the run, carrying everything through the building to the basement. As a result, only a portion of the top floor remained; the iron girders were somewhat twisted, though not displaced, but the concrete collapsed and fell, leaving nothing but the bare walls. The firemen could not be sent into this building. Had the upper floors been of wood they would undoubtedly have been saved.

The second instance is that of a fire on the second floor of a five-story warehouse built on a similar principle, wherein the third-floor sections of concrete fell while the firemen were directing the hose upon the second floor, with the result that its weight carried the second and first floors through into the basement. This fire would have been stopped on the second floor but for the collapse of the floors above.

The third instance is an illustration in favor of timber floors: At a riverside warehouse in the city of London I attended three fires on the same premises in three successive years; the first two were serious outbreaks, but I noticed on the last two occasions that the same wooden uprights still supported the floors, and many of the exposed wood joists bore evidence of their reliability on their charred surfaces.

Partitions. — I now come to the question of partitions. The reliability of partitions between the different sections and rooms of a building, whether dwelling-house or warehouse, to resist fire, is of the utmost importance, and often determines the fate of the building. The progress of a fire is often regulated by the area of the compartment in which it originates and the internal partitions; therefore much depends upon the time during which the latter remains intact. The wooden-lath and plaster partition may be immediately thrown out of court, the light laths with rough edges and the space between being a ready conductor of fire from one part of the building to the other. Internal partitions should be solid, preferably of brick, and continued up right through the building, the joisting at the different floors running through them, so that they practically form an internal wall from the basement to the roof. The advantages of such a partition would be many, apart from being a factor in fire-prevention.

Stairs.— Great stress is laid upon the idea of employing stone for staircases as a safe and reliable exit for a large number of persons from a building on fire. This is a very good principle under certain conditions, and these are that a stone stair should be built in a well, apart from the general building and in such a manner that fire or heat cannot possibly get at the underside of the stair. Where a stair-case must necessarily run through a building, stone or concrete should be avoided in its construction, but good solid wood (hard wood by preference) is the most reliable under all circumstances. If the underside of the treads be filled in with "deafening" and coated with good plaster, such a stair will remain in position during the progress of a fire long after it has been impossible for any human being to traverse it. If the stair should actually get alight, and the fire fed by an open door should even cause it to burn fiercely, so soon as the hose is applied by the fire-brigade the fire will be almost immediately extinguished because the actual burning is only superficial and there will remain sufficient substance to admit of persons passing over the stair.

It may be argued that a stone stair would not take fire at all, and therefore would always remain passable, but every fireman knows that when there is sufficient heat and flame to ignite the wooden structure of a hard-wood staircase it is quite impossible for any one to pass either up or down a stone stair under similar circumstances.

In my preference for wood in the construction of stairs I specially exclude light and flimsy wooden flights of stairs which are so very frequently found in some dwelling-houses, warehouses, etc., and the wooden step-ladder almost invariably found in factories. I speak of

[1] A paper by Arthur Pordage, Firemaster of Edinburg, Scotland, prepared for the International Fire Prevention Congress, held in London, England, July 6-11, 1903.

a well-built staircase with hard-wood treads and facings, the underside filled in with deafening and coated with plaster.

Stone, as employed in stairs in ordinary buildings, cannot in any sense of the word be considered to be "fireproof," because it succumbs to the effects of heat and fire more readily than any other material employed in the construction of buildings. That portion of the stone tread which is exposed to the fire readily expands under its influence, while the ends, which are embedded in the wall, remain normal, the natural consequence being a fracture near the wall and the collapse of the projecting portion.

I am continually told in Scotland that the reason so many lives are lost at fires in London is on account of wooden stairs, and that there is less loss of life in Scotland owing to the almost universal practice of putting in stone stairs.

Having had considerable experience at fires in both countries, I am in a position to say that the idea is entirely erroneous. Most of the lives lost at London fires are at small fires in small dwellings, and in the majority of cases in dwelling-houses situated over shops, where the access to the house is through the shop, thence by a very frail, unprotected and flimsy wooden staircase. When the shop takes fire, the exit from the house is immediately cut off by the fire and smoke rushing up the staircase. The same conditions apply to the ordinary London dwelling-house, which is let out to a large number of families — the open staircase runs from the street-door through the interior of the house, and every room opens onto it, and escape by this stair is cut off by the first rush of smoke or flame. The system which is almost universal throughout Scotland is very different.

Take a block of buildings consisting of shops with flats above: There is no communication between the shops and the houses. The proprietor of the shop does not necessarily live above it; in the majority of cases he lives in another part of the town. What are the circumstances when a fire takes place in one of the shops? It may be burned out, but, given that the ceiling is fairly good and the fire-brigade receives a good call, the fire will rarely pass the boards which support the 4 or 6 inches of deafening which is universal in Scottish buildings, and forms a splendid barrier to the fire.

The approach to the houses above being by a stair-well, built quite apart from any connection with the business portion of the block does not allow the fire to be communicated to the dwellings by the stair-well, for in order to do so it must first pass through the wall dividing the stair from the shop. It rarely happens that a shop fire in tenement blocks spreads to the house immediately above, and when it does, the inmates of the house have had time to escape by the independent staircase.

By way of justifying these contentions in relation to stone stairs, I recall a few instances observed at buildings after fires: —

At a fire in a large suite of offices with a spacious stone staircase some 6 feet wide, waste paper stored in the cupboard space under the stair leading from the ground to the first floor caught fire and was destroyed, a bucket of water was capsized over the stairs, and the whole flight immediately collapsed, scarcely leaving a fragment in the wall to indicate where the stone had been, while the thin wooden panelled door enclosing the cupboard remained intact, with the exception of the charring on the inside.

At a fire in a large music warehouse an unprotected and lightly constructed wooden stair led from the basement to the ground-floor, terminating on a stone slab 5 feet square and 5 inches thick, from which a handsome wooden stair led up to the first-floor show-rooms. The fire originated in the basement, and flowed up over the stairs to the first floor. When the fire was extinguished, both wooden stairs, which had been exposed to the full effects of the fire, were found much damaged, but sufficiently substantial to admit of the passage of the firemen; but the stone landing had collapsed into a thousand fragments.

Still another instance of the unreliability of stone for a staircase. At a fire in a fine old mansion-house which was partially destroyed, the stairs in the end wings were of stone from the basement to the second floor, while those from the second to the third floor and from the latter to the roof were of white-wood with wooden hand-rails. Practically no actual flame got into the staircase, but the heat passed up the stair-well, with the result that the whole of the stone stair collapsed, leaving heavy jagged ends projecting from the masonry, while the wooden stairs, where by far the greatest temperature must have been, were merely blistered and scorched.

Iron Stairs. — It has been equally demonstrated that iron, and especially cast-iron, is utterly unreliable under the influence of fire; while wrought-iron will buckle and twist itself out of position, cast-iron will collapse entirely. I gave an instance which very recently came under my notice at a fire in a manufacturing stationer's warehouse; the offices were situated on the first floor, to which a cast-iron spiral staircase had been erected in a specially constructed well as a safety exit for the office staff. The fire originated on the ground-floor. At the first rush several of the office staff made for the iron stair, but only a few were able to get down this stair; the others were cut off by the very first flow of flame and were rescued from the windows. The fire was speedily extinguished near this point, but the whole stair collapsed within ten minutes of the outbreak.

Roofs. — The matter of the general arrangement of roofs deserves to receive more serious attention than is usually given to this most important part of the modern building. Unfortunately a fire-preventive roof does not appeal to the artistic eye, especially in large modern country-houses, where the old English style of architecture with its long sloping gables has found so much favor of recent years. These high roofs admit of the fire running all over the building, and their construction prevents a fire being attacked from the outside until a hole has been burned through the roof. In all buildings where fire prevention is aimed at, the division-walls should be carried at least 3 to 4 feet through the roof, with a ledging of at least 24 inches round the edge, which would admit of men working upon it in case of fire. Such a ledging affords a ready means of both saving life and attacking a fire.

The roof is one portion of a building where iron may be used with advantage by reason of the light weight which it has to support and the necessarily exposed condition of its construction. A lightly constructed trussed iron roof reduces the risk of a fire originating and spreading in the roof to a minimum.

Conclusion. — The opinions I have expressed in this paper are facts well known to the fire-service and recognized by some architects, and are worthy of the most serious attention by the building profession generally. There are very many points in building-construction which are continually presenting themselves to the fireman, but which the architect rarely sees and has, therefore, no opportunity of studying, and these points when advocated, being so foreign to accepted ideas, are naturally very adversely received and criticised by the building profession.

As a case in point, some time ago while in conversation with the authorities responsible for an important historical building, I suggested that certain additional precautions should be taken from a fire-prevention point-of-view, and as a precautionary measure in dealing with a possible outbreak. I knew there were very bad risks, especially in the roof, which I pointed out, but was told that the building was perfectly safe, the roof was not an old one, it had been renewed not more than forty years ago, and that iron doors had been put in to divide the different sections of the building. Now every fireman knows that a long continuous roof which exposes a forest of unprotected and rough edged and dried timber is a very dangerous risk; also that iron doors have long proved a failure as a protection against the spread of fire, and that they are inferior to a solid heavy wooden door which remains in position long after the iron door has buckled out of its frame and ceased to fill up the opening.

Whether or not I have made my meaning clear or overstated my views I think you will at least agree that the subject is one of more than passing importance, and that exchange of views and experience is most desirable. To prevent possible misunderstanding I desire to say in conclusion that while advocating the more general employment of timber in buildings, I do not include in this category the light pine and deal stairways, thin wooden doors and match-board lining partitions, but the employment of substantial timber well protected where possible and, of course, the avoidance of all exposed edges.

The conclusion I have arrived at after much observation during a long experience of fires in London and Edinburgh is that "fireproof" construction as generally understood is a source of danger; that wherever possible good timber flooring, supports and stairways should be employed together with brick partitions; a liberal application of plaster and an avoidance of air-spaces would result in a lesser destruction of buildings by fire, insure easier manipulation of fire-appliances and a more effective use of the same, and result in a greater salvage of property during the progress of fires.

In a word, I advocate the study and use of fire-retarding, rather than non-combustible, materials as the direction in which safety and fire protection may more certainly be found; while where the more modern forms of planning necessitate provision for big spans and very heavy loads, the systems of construction now erroneously termed "fireproof" must be so protected as to become fire-resisting.

HOW TO MAKE EXISTING LONDON BUILDINGS MORE FIRE-RESISTING.[1]

AS you may imagine, the subject of this paper is not one which I should have chosen, and if it turns out that it has no fresh information to offer you, the excuse must be that nearly all that can be said on the subject has already been dealt with. Still, renewed consideration of the subject *may* bring out some fresh points, and if I cannot give any useful hints I always console myself with the hope that the discussion may bring out forgotten or overlooked information.

One might admit at once that to make all existing buildings in London fire-resisting is a practical impossibility, so that you must take my remarks only as suggestions as to what might be done towards making buildings less inflammable than they are at present; even this might involve such an enormous expense that the owners of all classes of property would, I fear, look on my ideas as not in their particular interest; however that may be, we all have a duty to do towards our neighbors, and that consists partly in making buildings as safe as can reasonably be expected against danger to life and property therein contained.

To carry out the idea of this paper in a logical manner I should begin by dividing up the districts of London into risks, and then the buildings in these districts into subdivisions of risks, but this sort of work, I think, I may safely leave to those whose particular business this is, from an insurance point-of-view; my chief concern will be to

[1] A paper by Max Clarke, A. R. I. B. A., prepared for the International Fire Prevention Congress, held in London, Eng., July 6–11, 1903.

deal with constructional details only, combined, of course, with the inherent danger there always is in the proximity of one building to another — always a source of real danger in large cities such as London. For instance, particular portions of the city of London have unfortunately got the reputation of being what are called dangerous areas. This may be due not only to the buildings themselves, but also to the nature of the goods stored therein, and for this class of building I am afraid little can be done. The only thing we can hope for in this division of the subject is to render them less liable to communicate fire to those adjoining.

On the other hand, large numbers of buildings not having within them goods or materials of a particularly inflammable nature are built or fitted up, and particularly the latter, in such a manner as to render them very dangerous when by some unfortunate accident they do get on fire.

Many of these buildings in their construction contain all the elements of danger, both to themselves and to their surroundings, and it is more particularly with regard to these that I consider a paper of this nature should call your attention. The idea of pulling down London wholesale, or converting all its buildings at one time into what are erroneously called "fireproof" structures, is eminently absurd. Still, much might be done at a moderate expense, which would render buildings and whole areas much less dangerous than they are at present.

Match-board. — For instance, take the one item "Match-boarding." It is used in all sorts of places, in most of which it could very well be done without as regards the construction, and it is a material which, so far as safety in case of fire goes, should not be allowed under any consideration whatever. And yet one hears very little against it probably because no one thinks of the extra danger involved in its use, or does not want to think, simply because it has been used heretofore and it is convenient, easily put up and just as easily removed, requires no time to dry, and is easily painted or decorated. Its use on walls and ceilings, particularly the latter, is much to be deprecated. I am now speaking more particularly of boarding made from soft woods, which when dry and painted or varnished is highly inflammable, the fire passing along it at a high speed, often rendering escape from a building impossible, even in the early stages of a fire.

The limited use of hard woods as wall-covering for decorative purposes is not objectionable, particularly if fixed without any air-space at the back. In all discussions of the present nature we should be most careful not to advocate views which would prove to be what may be called so excessive as to frustrate the very object intended. I would only make one further remark with regard to this class of material, and that is how fatal the results are when it is used as a ceiling-covering with plenty of air-space behind, seemingly specially arranged to create rapid and intense combustion.

In making these remarks I am quite aware that in the opinion of many this class of wall and ceiling covering possesses certain advantages, being suitable for buildings in which certain trades are to be carried on. My object is to impress upon you that these ideas are already antiquated, and that for every class of building and every trade some form of covering can be found equally suitable from all points-of-view, without any of its special element of danger.

Naked Ceilings. — We may now pass on to a form of construction which, alas, is even more common in London than the one above mentioned, viz: leaving large areas of the floor-joists of buildings without any covering whatever on the underside. This is done, of course, with the clearly defined object of saving money in first cost, and it *does* save a certain amount; but whether that saving is commensurate with the greatly increased risk such a system of construction involves is for you to decide.

I hope it will not be one of the arguments during the discussion that numbers of buildings constructed in this manner have never had a fire in them. This does not seem to me to be discussion at all; at any rate it is *not* "Fire-preventive" discussion.

There is one aspect of the case which must not be overlooked, viz: "What is Fire-protection worth?" In these days of commercial speculation, most buildings have a remunerative value, beyond which the speculator will not go; his idea is that given a building which can be insured at a reasonable rate, it would pay better to build it in the cheapest manner than to expend a larger sum on a more fire-resisting building. The risk of its being burned down is taken as a quantity worth so very little consideration that in many cases it is accepted in preference to the safer building. This, of course, is the difficulty met with in any attempt to make fire prevention general. But for this, London would be fire-resisting and I should not be before you at this moment.

However, I have to try and bring to your notice items in every-day construction which could be brought into line with modern ideas without wholesale reconstruction.

The cure for the evils which I have already pointed out is, that in future match-boarding should not be used in new buildings, and after a certain date it should be removed from all old buildings. The naked joists in ceilings could easily be corrected and the ceilings made fire-resisting by covering them with wire netting or some form of expanded metal and plaster.

Studded Partitions. — I need hardly remind you that the ordinary wood partition with its wood-lath and plaster covering, leaving hollow spaces from top to bottom, *should* be a thing of the past. Unfortunately such is not the case, in spite of the numerous forms of light partitions made which are non-inflammable and have no open spaces. Why the latter are not used it is hard to say, but if after a certain date stud partitions were to be abandoned it would render London as a whole much more fire-resisting than it is at present, and at a moderate cost.

Lift Enclosures and Doors. — I must now turn to a matter which seems to me to be most important in buildings of the warehouse class, namely, the means adopted at present for the prevention of the spread of fire in lift-wells and generally in vertical shafts of this class. There is no doubt that this particular risk is not sufficiently considered, and great improvement could be made as regards retarding the spread of fire if all lift-shafts were properly enclosed with some form of non-combustible material. The particular nature of the material I need not attempt to specify, as it would largely depend upon whether the building was an old one or in course of construction. If the latter, there is no doubt brickwork would be the most suitable, but some other enclosing material would be efficacious, at any rate for short periods, and it is these short periods which in the initial stages of a fire are of the utmost importance.

The doorways or openings to the lift-shafts should not be mere openings, as is so often the case at present, or if the openings are fitted with doors they are too often of an open type, not in any degree preventing the passage of smoke and flame up the shaft. Iron doors are often fitted to openings, in cases where there *is* a solid enclosure; but the doors are not close fitting and the fastenings are not designed with a proper regard to ease in opening and closing, and quite regardless as to their adequacy for preventing the doors bending or twisting when heated to a high temperature. Where the latter is possible of course flame and smoke pass through the small openings and ignite inflammable material on the other side, thus *contributing* to the spread of fire to an alarming extent.

Fire-resisting Doors. — Another small matter I have observed in connection with iron doors, which should be avoided, if proper fire-resisting qualities are to be obtained, is the total neglect displayed in keeping inflammable material at a sufficient distance from iron or other forms of fire-resisting doors. Only by exercising proper attention to this point can the full value of such doors be obtained. A door may in itself be a good stop against fire, though it become red hot; but it is useless if in contact with, or in close proximity to, combustible material on one or both sides. Attention to this matter is sadly wanting at the present time. Wood floors should not be carried up to the iron door-frames, but a fairly wide threshold of concrete, stone, or the like should be formed on each side, and the same remark applies to the whole of the opening on both sides, as it is impossible to foretell on which side of the opening or shaft the fire may occur.

Fittings. — The same remark applies to fittings in shops and warehouses, not to say public buildings. Often after the building has been left fairly secure in the direction above mentioned, shop or other fitters come on the scene and fix woodwork everywhere as trade-fittings, totally regardless of the fact that a fire might occur — and I presume we are all agreed that they do occur — when least expected, from one form of accident or another, and it is only by bearing these facts in mind always when designing, constructing, altering or fitting up a building that the fire-resisting qualities of a structure, district or city can be improved.

Fireplaces. — I shall now call your attention to some of the defects in fireplaces and flues which are being repeated every day in modern building work, and I hope you will understand that throughout my paper my attempt is to show the defects in London building, as it is only by deciding what the defects are that remedial measures can be taken.

Few know the number of fires caused by defects in and about the fireplace. Personally, I am disposed to think that most of the causes are brought about by careless workmanship, and a few perhaps by the use of methods which were quite adequate in former times, before the invention of what are now called slow-combustion stoves, close-ranges, boilers and the like. I place first in point of danger the practice of building half-brick trimmer arches to carry hearths in wooden floors, the arches having the centring left in and forming an open space under the brickwork. The underside of this space is lathed with wood laths and plastered in the same plane, as a rule, as the rest of the ceiling. This form of hearth should give place, in my opinion, to a concrete or other self-supporting hearth, the full depth of the floor-joists, having a flat soffit upon which the plaster could be applied direct. Next I should like to advocate the use of fireclay linings to all flues, a common practice in many districts, but not in use as a rule in London. Improperly bonded and badly built flues, the brickwork of which is only 4½ inches thick, and in which bad mortar forms a considerable component part, and which after a time drops out leaving the joints open. This is often assisted or caused by the nails, spikes, or plugs, driven in for the purpose of fixing inflammable finishings. All these defects lead to a considerable number of fires annually, the details of which I am sure my insurance friends know a great deal more about than I do. Wood finishings should not be fixed with iron spikes in front of flues unless the brickwork is of a greater thickness than 4½ inches; in fact, it is probable that a great safeguard against fire would be effected if woodwork in such proximity to flues was abandoned altogether. It seems to me a cause of danger that flues built with only half-brick surroundings are at times used for high-pressure boilers, kitcheners and the like, the brickwork being quite hot when the day's work is in progress, and in many cases much too hot for safety.

New types of stoves of either the "slow combustion" or "well fire" classes should not be fixed in old houses, unless a thorough examination of the hearth and its surroundings is made, numerous fires having been caused from timbers being in close proximity to chimney-breasts, quite unknown to the people who fixed new and powerful stoves in old openings.

Areas, Light-wells and Narrow Streets.—In cities like London, where land is of such great value, the size of areas and light-wells will always be reduced to the smallest possible dimensions, thereby greatly increasing the risk of fire spreading from one building to another. The same remarks hold good with regard to narrow streets and courts. In cases such as these the only precautions which can be adopted are of a protective nature.

Windows in light-wells should not be directly opposite each other, should be fitted with metal, or at any rate with hard-wood frames, the glass should be wired or armored so that when cracked it would not drop out of the frames at once, thus allowing the passage of flame from one building to another with fatal rapidity. In more dangerous cases, blinds of non-inflammable material might be used with advantage, or, better still, shutters which would fit the openings closely, constructed in such a manner as to prevent much twisting or buckling, and provided with fastenings, which while admitting of rapid adjustment would be secure against opening by accident or from falling bodies on the outside.

Shutters or blinds for use in courts or areas might be made of woven wire mounted on frames. This form would admit of a certain amount of expansion or contraction without damage to the frame; would admit a certain amount of light, which is always an advantage, and could be seen through from the inside, also a benefit in many cases.

In connection with any form of shutters, such as above advocated, the objection to having wood finishings near them cannot be too strongly brought before your notice. Any real advantage the shutters might be in case of fire in an adjoining building would be largely discounted if inflammable material was close to the openings *supposed* to be protected by the shutters.

My paper is practically at an end. I hope you did not expect startling theories, for most certainly you have not heard any, and for this omission I suppose I should ask your indulgence.

My opinion on these matters is that we do not take advantage of the information we possess. Knowledge is of no use whatever unless properly applied, and my contention is that there is a vast store of information on this particular subject which is not made the least use of. What has been done before is repeated without properly examining the new methods with the object of applying any which might suit particular cases.

I have not dealt with any of the modern forms of fire-resisting construction; many types are so well known that they need no words of mine either of praise or condemnation. All I would say is that, as a rule, the details are not sufficiently attended to. In the case of sanitation we have for many years had good pipes, but even now we sometimes have not good drains, and only by the very closest attention to the minor details shall we ever get them. It is exactly the same with every form of fire-resisting construction and any attempt to make buildings or districts safer than they are at present. If I may digress from the subject for a moment I would like to address a word to "the man in the street," if any such be here, as to the saving of life from fire. Has he ever thought of the value of fifty yards of moderately stout rope and a block or pulley with a hook in the ceiling in front of a window? Why such a modest equipment should not be in every house I cannot imagine. A stout belt with its ring and spring catch would be an advantage; but I say, given the rope and block, there is no reason why escape should not be practical for men — and for women also when there are men to assist them — from every building in London. With regard to such places as Eton or other public institutions, each individual should provide himself with his own rope, as he does his cricket-bat or fountain-pen. It might be years before it was required, but *when* required it should be in perfect order, ready for use at a moment's notice. We are desirous of helping all sorts and conditions of men and women, but it is also expected that they should do something to help themselves.

STRIKE OF THE ENGINE-DRIVERS OF VICTORIA.

WHAT so speedily broke the recent strike of engine-drivers on the State railroads of Victoria, Australia, was the fact that it was a strike against the public, and thus was robbed at the outset of any support from public opinion.

The State of Victoria prohibits its employés on the railroads from affiliating themselves with any labor or political association. The central organization of unionism in the State is the Victorian Trades Hall, which is deep in politics and seeks control of the Government. It undertook to bring the State railroad employés into the union, and the engine-drivers yielded to the persuasion. These employés are all well paid, given pensions on retirement and otherwise treated considerately by the State, which, as in the case of the other States of the Australian Commonwealth, is notoriously radical in its policies as favorably affecting the working-classes. When the engineers made known their intention of joining the central labor organization, the Government promptly forbade the step on the ground that it was contrary to the service regulations, and that the State could not recognize the authority of any outside private organization over its employés. But the engine-men persisted, and were then told they must leave the service and forfeit their pensions, or forego their intention. So the strike came, many of the engineers quitting their locomotives in the midst of a journey. Only ten drivers remained loyal to the State.

For a few days traffic was much demoralized, but the general public rose heartily to the support of the Government. Premier Irvine called a special session of the Parliament, which entered at once on the consideration of a bill to suppress strikes on the part of public servants and employés — participation therein being made an offence punishable by fine or short imprisonment. The public temper was shown in the crowds of people of all classes who gathered outside the Parliament houses and cheered the Government. In one case, says an account of the affair in the New York *Sun*, "where an interstate express train was abandoned by the engine-driver — at a country crossing — the passengers tramped in a body to the nearest telegraph station and promptly wired Mr. Irvine, exhorting the Government to remain firm." So general was the uprising in favor of the Government — including all classes and parties except the comparatively small body of Trades Hall unionists — that the latter became alarmed. They found that they had gone too far in adopting a dictatorial policy toward the State, and in further fear that Parliament would enact the drastic measure under consideration, they made haste to back down. Within nine days of the beginning of the strike the engine-drivers voted to give way absolutely, and went back to work. It is safe to say the State of Victoria has experienced the last strike among its own employés for a good many years to come.

The case is illuminating in regard to the relationship between public ownership in industry and the labor or strike problem. The strike can gain no permanent foothold in that quarter, and this for the reason that the State is not in business for the profit of any one, except the whole people, and that the whole people as an employer of labor will not tolerate measures of force and dictation from any particular class of interests. A strike in such cases is a strike against the public, and public opinion will invariably and most effectively antagonize it. Nor is there in this any unreasonable interference with the conduct and rights as citizens of public employés. As an employer the State or the municipality in a democratic country will always and necessarily prove — and has always proved in this country — a generous and considerate employer, adopting higher standards as to wages and hours than obtain as a rule in private employments; and there is no lack of justification for the State in prohibiting the employment of coercive measures on the part of its own labor such as are tolerated in private industry, where other means of securing for labor fair remuneration are less available. But the time is not distant when even in private employment the State will insist upon other methods than the strike of adjusting questions in dispute between employer and employed. — *Springfield Republican.*

THE SISTINE CHAPEL.

THE condition of the roof of the Sistine Chapel in Rome has for some time been unsatisfactory, and the late Pope, just before he was seized with his fatal illness, gave orders that the necessary works of repairs should be taken in hand at once. The gravity of this statement will be appreciated by those who realize the unique place in religious art occupied by the chapel that Prinetti built for Sixtus IV more than four centuries ago. There are said to be several fissures in the plaster, and some of the wooden supports of the vault are giving way. Iron cross-bars are to be substituted and the cracks made good, and we are assured, with the familiar Italian optimism, that all danger will then be at an end. We trust it may be so, since any disaster to the immortal Sibyls and Prophets with which Michael Angelo enriched the world would be a much more serious matter than the collapse even of a Campanile. But this is not the first occasion on which the Sistine roof has been matter of concern. Before now water has even trickled through cracks in the dome, while the paintings themselves, once so resplendent, have become faded by time and dimmed by the smoke of tapers and incense. On the whole, the Popes have taken good care of the treasures which art and ambition have lavished upon the buildings under their care, and it is impossible to imagine that any pains will be wanting to preserve the monumental conceptions that we owe to the magnificent ideas of Julius II. The vault of the Sistine is, indeed, the most conclusive instance in history of what art owes to the patron.

When he began the work in 1508 Michael Angelo regarded himself as a sculptor only. Color was strange to him, he was persuaded to the task with difficulty, and the payment he received for it would be despised by a fashionable decorator. Yet in this narrow and lofty fane, which, before it was overlaid with the work of his genius, must have been gloomy in the extreme, he poured out his soul in a new revelation. In travail and weariness, with no companions save his color-grinder and the impatient pontiff, who would not be denied, and with little relaxation except the sermons of Savonarola, he painted his way to immortality.

Even so great a man as he had to cope with troublesome material difficulties. Bramante failed to devise an appropriate scaffolding, and the creator of this grandiose Old Testament cycle, who gave life to the statuesque forms of the mysterious Sibyls, had to invent his own. In his lack of experience with the medium he made the plaster too wet, and would at first have despaired. It was a Titanic work,

with its great surface, its sternly splendid imaginings, the sense of awe and immensity that broods over it, the technical illusions which convert a mere ceiling into a limitless vault peopled by patriarch and oracle. Botticelli and Perugino, Pinturicchio and Ghirlandajo have made the walls of the Chapel glow with their frescos, but they are all a mere preparation for the dome, which seems to typify art and eternity. Nor does this ceiling exhaust all that Michael Angelo accomplished in the then detached building which finally became part of the corpus of the Vatican.

Late in life, "The Last Judgment" was to come as a frescoed altar-piece for which the reckless Papal magnificence destroyed the three Peruginos that occupied its place. But who that enters the Sistine, and reflects that the great Florentine spent thirteen years of his life within these solitary walls, has much thought for any other man? The place is his monument. Not even the prudery of Paul IV, who clothed the female saints in vesture of hues as crude as the puces and magentas and solferinos of the early sixties, could destroy the noble austerity of the picture which its author refused to paint in oil, as being a mere vehicle for the idle and the lazy. It is difficult to smile at the grim revenge which placed the Pope's artistic mantua-maker in the pictured hell. As the scene of ceremonies gorgeous or touching, the Chapel is famous in religious history.

Mme. de Staël has left a graphic description of the gradual extinction of the candles during the chanting of the Lenten Miserere in the Sistine, when the Sibyls look like phantoms in the twilight, and the ear can hardly support the mournful cadences. She was afraid to listen once more to the vulgar sounds of that world which seems so far away when the silver trumpets are hushed and the Pope-King is no more upon his throne. — *London Standard.*

Books & Papers

THE art and architecture of England prior to the Norman Conquest is but little appreciated when compared with the much richer developments which follow the inroad of French art and civilization. The period ending with the middle of the twelfth century, however, is one of which a surprising quantity of remains are still in existence, and about everything that can be said upon the subject has been collected under the title of "*The Arts in Early England*"[1] in two volumes which constitute a most interesting introduction to the study of English art. Indeed, an acquaintance with these volumes is almost essential to an understanding of the early work in England and of the spirit which even to this day exists in so large a measure in the country life of our cousins across the sea. The first volume is chiefly archæological in its nature. It describes very carefully the Saxon and Danish village, the forms of government and the social fabric, besides giving a very succinct account of the ecclesiastical history of the British Isles up to the time of the final conversion of the immigrant Saxons at the close of the seventh century. The second volume takes up in detail ecclesiastical architecture in England from the conversion of the Saxons to the Norman Conquest. It is not, however, strictly a history of pre-conquest architecture, for a history implies development, and in Saxon architecture, as in Saxon civilization generally, there was neither continuous progress nor evolution. It is a descriptive survey rather than a history and embraces examples from all periods and all parts of the country with an excellent outline map and an index list giving the names and positions of examples. The illustrations of the volume are worthy of especial praise. The plans, with very few exceptions, are all drawn to the same scale and appear on the page to a scale of $\frac{1}{16}$ inch to the foot, a method of procedure which is often ignored in architectural treatises, but it is a great advantage to the reader as affording a means of appreciating both absolute and comparative dimensions of the building discussed. The drawings, of which there are several hundred in the work, are stated to be based on the writer's own measurements and notes. While they are by no means remarkable as mere pictures they serve their purpose quite as thoroughly as Viollet-le-Duc's most admirable architectural drawings. We are unable to judge of their absolute correctness, but they have the appearance throughout of being made by one who regarded drawings entirely as illustrations of fact and who sought to convey in the drawings the exact conditions of the subject. The typography and the general make-up of the volumes is very satisfactory in every respect.

We are apt to think of the Saxon period in England as one which was not marked by a great deal of building activity. While this is undoubtedly true it was at the same time true of a great portion of the world. Even Rome, the mother of ecclesiastical statecraft, was in matters of art the most unproductive of all the centres of the West during the mediæval period and the best thought of architectural critics to-day inclines to ascribe the origin of even the Italian Romanesque to extraneous influences. The experiments which were being made during that period in construction and planning which transformed the early Christian into the mediæval style had their rise more in centres like Cologne or Tours or even in parts of England.

[1] "*The Arts in Early England.*" By G. Baldwin Brown, M.A., Watson Gordon Professor of Fine-Art in the University of Edinburgh. New York: E. P. Dutton & Co. 1903.

While the early Saxon architecture was influenced but little by the surviving examples of Roman art, on the other hand some of the principles and methods of Roman constructions persisted in early English work in much the same manner as they endured through all the changes of French architectural development.

Considering the fact that the Romans governed Britain for a period of several centuries, it is altogether surprising how little trace they left upon the manners and the arts of the inhabitants. Whether the Saxon and Danish invasions obliterated everything that went before or whether the Roman work in Britain was of too provincial a nature to be worth observing, it is impossible at this date to ascertain. There are fragments of masonry scattered throughout Great Britain which are classified as Roman by origin, but none of these indicate any great architectural achievements, and the Saxon architecture is singularly free from the kind of Roman influence in design which is so marked in the mediæval French work.

In their technical aspects the Saxon churches exhibit a mingling of the Celtic and the Roman traditions. The masonry, commonly of irregular rubblework, was compacted in walls, generally of remarkable thinness, which are of the same character as the Roman work in which large square stones were used wherever available for quoins and special features, and it was a familiarity with these that gave the Saxon builders a liking for the megalithic. The materials and technique were for the most part Roman, but the Saxon used big material however he could procure it, and the large square stones of his quoins, flat lintels and slabs of large superficial area that line his door-jambs were not always Roman stones reused. The work shows in many cases an initiative, a seeking after architectural effect and a consistency and method in both design and planning which under more favorable circumstances would undoubtedly have worked out into a completed style. The best of the work is the latest. The German ideas were introduced into England at the time of the marked activity in church building which signalized the reign of Edgar, 157 to 175 A. D. The Norman invasion did not at once obliterate the Saxon sentiment, and much of the early Roman work shows that if they had been left to themselves the Saxon architects would have developed some very interesting qualities in design.

The Danish influence in England seems to have been entirely negative. They were never builders by instinct and their influence is measured by matters of language and custom rather than architecture. The Anglo-Saxon architecture, at any rate in its later phase, represents the direct influence of the Austrasian Romanesque, and belongs by origin to German rather than French Romanesque, but while closely allied to the work of Germany it has at the same time its own individual features, and though its development as a style was extremely slow and has proved very difficult to trace, the volume under consideration shows a decided development at times. The great majority of the existing remains are those of the village or parish type, though fragments exist of at least two bishop's churches, Rochester and Sherborne, and one abbey church of an important establishment at Peterborough. The Saxon village church was fairly up to the general mediæval standard of structures of the time. In regard to the matter of imposing edifices they of course never reached the standard of the late Norman and Gothic structures both from lack of means and from lack of desire. All of the large churches have been replaced by the structures which the Normans erected so lavishly throughout the land.

The second volume contains also a very interesting and careful study of the remains of the early Irish architecture which shows a remarkable development such as, we imagine, is little suspected by the average student of architecture.

It is a pleasure to read this work. The author at times allows his antiquarian instincts to come pretty sharply to the front, but he is always an enthusiast and his interest in his subject never flags nor is wearied by detail, so that the reader is insensibly carried along with the continued interest of the recital.

Illustrations

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE NEW ENGLAND CONSERVATORY OF MUSIC, HUNTINGTON AVE., BOSTON, MASS. MESSRS. WHEELWRIGHT & HAVEN, ARCHITECTS, BOSTON, MASS.

DETAIL OF THE FRONT OF THE SAME.

A COMPETITIVE DESIGN FOR THE IMPROVEMENTS AT THE U. S. MILITARY ACADEMY, WEST POINT, N. Y.: THE ACADEMY. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

A COUPLE OF NEW YORK DOORWAYS: NOS. 6 AND 8 EAST 62D ST.

Additional Illustrations in the International Edition.

THE EBEN D. JORDAN ORGAN: NEW ENGLAND CONSERVATORY OF MUSIC, HUNTINGTON AVE., BOSTON, MASS. MESSRS. WHEELWRIGHT & HAVEN, ARCHITECTS, BOSTON, MASS.

OFFICERS' QUARTERS: A COMPETITIVE DESIGN FOR THE IMPROVEMENTS AT THE U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

CAVALRY AND ARTILLERY QUARTERS AS ARRANGED IN THE SAME SCHEME.

NOTES & CLIPPINGS

THE RAILROAD DRAIN ON OUR FORESTS. — According to a recent estimate of the *Railway Age*, the railroads of the country are using ties to replace those worn out by use at the rate of 110,000,000 a year. This estimate, which may be taken as fairly authoritative, suggests some interesting conclusions. It does not, of course, include those laid for new mileage. At the prevailing average rate per tie (fifty cents) the cost aggregates $55,000,000 annually. To secure ties even at the present market price, railroads often transport such supplies 700 miles. It appears, therefore, that the use of the class of timber now being purchased cannot long continue. As a consequence, the Government has taken up the question of experimenting upon available wood by treating each specimen with preservatives in order to add years to the average period of usefulness. The railroads in France have been so successful in this direction that beech ties are made to last thirty-five years. Many of those in use in this country, even of supposed standard qualities, must be relaid in from between three to five years. The American Telegraph and Telephone Company used 150,000 telephone poles and 3,000,000 feet of timber in cross-arms last year, therefore it can be readily understood that the subject of seasoning and preserving wood is not confined to railroad companies alone. The matter was brought to the attention of a railroad officer familiar with the subject this week, and in going over the cross-tie problem he said: "Experiments now being made will doubtless end in the use of cheaper timber, as the cost of treating several grades of pine, for instance, is comparatively small. The best results obtained, so far, from natural timber has been from oak, but present prices prohibit the use of such wood for ties. Cedar brings a good result, if tie-plates are used. These are necessary, however, as the wood is soft. Those people who ask and keep on asking for a larger dividend rate have no idea what it costs to run a railroad. At the average rate per tie, the cost of replacing such material annually is $55,000,000. Mention ties to an ordinary investor and he will say, 'What do ties amount to?' Ahead of ties as an actual operating expense comes labor, coal, iron, lumber and rails. Our troubles are many."

STONEHENGE OFFERED TO THE ENGLISH GOVERNMENT. — Sir Edmund Antrobus has, through Lord Edmund Fitzmaurice, chairman of the County Council of Wiltshire, made a definite offer to sell Stonehenge and eight acres of the land occupied by these magnificent Druidic ruins to the English Government for $250,000, on the understanding that they will be preserved for the nation. Some years ago Sir Edmund made an offer to dispose of Stonehenge and twenty acres of the land on which the great stones stand for $750,000 to any one who was willing to pay that price, and great alarm was expressed lest some American multi-millionaire might purchase the celebrated megalithic monuments and carry them off to the United States. But this fear has not been realized. Sir Edmund's desire to get rid of Stonehenge is in no small measure due to the annoyance to which he has been subjected in the last few years in connection therewith. It was shortly after his accession to the baronetcy and estates on the death of his father in 1899 that he determined to surround Stonehenge, which forms part of his property, with a barbed wire fence, and to charge an admission fee of twenty-five cents, his object being to protect the stones from the injurious treatment to which they were being subjected by people without any reverence for the hoary past. Moreover, as some of the stones were in danger of falling he feared that in the event of anybody being injured thereby he might be held financially responsible. Exception, however, was taken to his attitude. It was said that inasmuch as Stonehenge had lain open to all the world since English history began, the public had acquired a right-of-way through every portion of the grounds on which the stones stood, and likewise a proprietary interest in the stones themselves. Then, too, it was pointed out that anything in the shape of a modern inclosure destroyed the spell created by the aspect of those immense stones standing alone in strange circles far from human habitation in the midst of a vast, open, rolling plain. And the result was that not only the general public, but likewise men of culture interested in the preservation of national monuments raised a fund with the object of testing in the courts not Sir Edmund's proprietorship of the ruins, but his right to inclose them with a wire fence. — *Marquise de Fontenoy in N. Y. Tribune.*

THE MAXIMILIANEUM, MUNICH. — The Maximilianeum is one of the modern adornments of Munich, though built in an ancient style of architecture. The western façade is seen from the liveliest part of the city and has large frescos by Carl von Piloty, Michael Echter and Feodor Diez. Unluckily for these onetime masters, the frescos have not withstood the attacks of the climate; for many years they have only faintly indicated their meaning. Piloty painted in historical style the founding of the "Ettal Monastery," the "War of Minstrels in the Wartburg," and the foundation of "Ingolstadt University." Among those by Diez is the "Raising of the Turkish Siege of Vienna," and among those by Echter the "Treaty of Pavia." After long deliberation, the Ministry of Interior for Bavaria decided to renew these pictures in glass mosaics, using for the purpose the Royal Institute of Art Mosaics, whose Director is the painter Ranecker. Seven of the nine pictures have been translated into glass mosaics, and the other two will soon follow. Objections are made to such reproductions on the ground that they were not architectural enough and also on the ground that the brilliant, unchanging mosaic fails to give the spirit of fresco painting. But as these pictures have become part of the decorative whole in Munich, it was decided to replace them as nearly as possible in the color scheme they had when new. Visitors of Munich will be surprised to find a building which seemed to be very old, because of the faded frescos on its west front, shining with all the brightness of unalterable mosaic. — *N. Y. Times.*

OUR FOREIGN TRADE IN FOREST PRODUCTS. — A notable exhibit of this country's trade in forest products is contained in a report just issued by the division of foreign markets in the Department of Agriculture. It appears that during the fiscal year 1902 we imported $59,000,000 worth of such products and exported $49,000,000. The tendency indicates that the balance may before long turn in favor of the export account. Ten years ago the imports were valued at $50,000,000 and the exports at only $28,000,000 — a gain of more than $20,000,000 for the latter and less than $10,000,000 for the former. The imports are chiefly of things that, by their nature, must come from abroad, while the exports are mostly products that our forests yield in greater abundance and cheapness than is the case in other countries. The principal item among the imports is formed by the several gums from which rubber is made. The value of these was in excess of $25,000,000. Other gums imported in considerable quantities, chiefly from tropical lands, were copal, shellac, gambier and chicle. Lumber is imported to the amount of over $12,000,000, mainly from tropical countries of the temperate zone, with Canada at the head. Nearly a million dollars worth of timber, mainly in the round — that is, in the form of logs — also came in. Cabinet-woods to the value of $3,361,000 came almost exclusively from the tropics, with mahogany as the most important item. Dyewoods, with logwood as the principal article, also came from the tropical sources. Over 67,000 tons of wood-pulp, worth more than $2,000,000, came from Canada, Sweden, Norway and Germany. Cork-wood and cork-bark, valued at $1,816,000, came mostly from Spain and Portugal. Among various other forest products were cinchona bark, vegetable ivory and ground sumac. In exports, wood was by far the most important factor, the combined shipments of lumber and timber amounting to $36,000,000, the lumber having a value of $26,000,000 and the timber $10,000,000. Boards, deals and planks went chiefly to the United Kingdom, Canada, Mexico, the Netherlands and Argentina, and there were also large sales to Belgium, Cuba, British Australasia, Germany and British Africa. Staves and headings to the value of $3,954,000 went extensively to France, the United Kingdom, Spain, Portugal, the Netherlands, Germany and Italy. Other leading items were shooks, joists and scantlings and shingles. Timber went abroad in the shape of round, hewn and sawed. The only other item of much importance in our forestry exports was what is known as "naval stores," comprising spirits of turpentine, rosin, tar, turpentine and pitch. The spirits of turpentine were valued at $7,431,000 and the rosin at $4,202,000. In all these exports the United Kingdom was our best customer. Other forestry exports were wood pulp to the value of $740,000, tan bark worth $288,000, going chiefly to Japan, and a small amount of charcoal, valued at only $5,000. — *Boston Herald.*

NATURAL GAS IN ENGLAND. — In the August number of *Cassier's Magazine*, Inverness Watts gives facts regarding natural gas in England. He speaks of the first discovery of gas in East Sussex as long ago as 1875, and of subsequent discoveries, the most important having been made in 1896 at the Heathfield Railway-station of the London, Brighton and South Coast Railway. The railway company desired to obtain a better quality of water for their engine-tank than that afforded by the present surface spring supply. Accordingly a 6-inch bore-tube was sunk, commencing at the bottom of a sump 73 feet deep, into which the surface water had been allowed to flow. Gas appears to have been discovered a long time before its inflammable properties were tested, a strong odor of gas having been noticed for some days; but the smell was attributed to the presence of "foul air" in the bore-tube. At a depth of 312 feet from the level of the permanent way the smell and rush of the gas were so pronounced that (by way of experiment) some one applied a lighted match to it, when a body of flame sprang up, the height of which is variously stated, the maximum estimate being 16 feet. It was extinguished with great difficulty, by means of damp cloths thrown over the mouth of the tube. The gas continued to increase during the remainder of the depth bored. The boring was abandoned at a depth of 377 feet, no useful amount of water having been obtained. The wrought-iron tubes were withdrawn from the bore hole, with the exception of one length, which still remains in the ground, the tube being continued upward to near the top of the sump. A cast-iron cap has been secured onto the top of the bore-tube, with a ½-inch bend and stop-cock affixed thereto, and Heathfield Station has been lighted throughout by gas from this boring since 1898, consuming about 1,000 cubic feet each night. More recently many other borings have been successfully made for natural gas in various parts of Sussex, and are likely to have an important influence in attracting and developing new industries. — *N. Y. Evening Post.*

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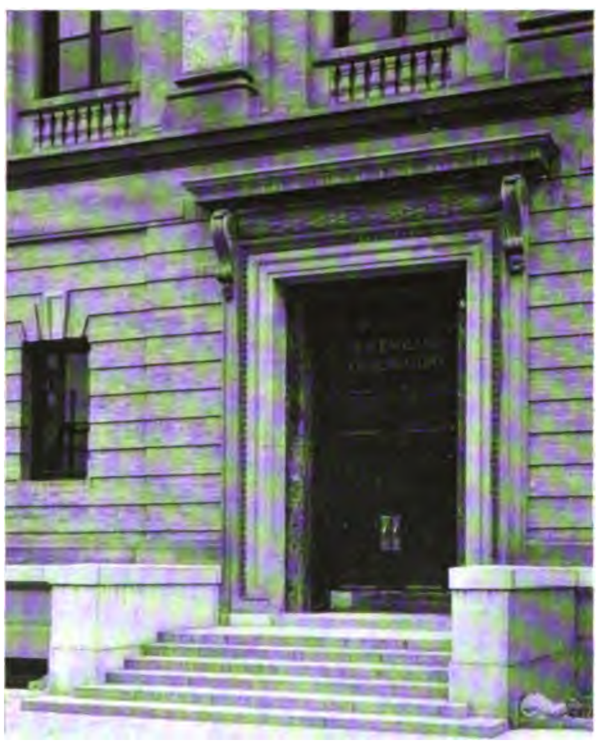
THE NEW ENGLAND CONSERVATORY OF MUSIC, BOSTON, MASS.

THE EBEN D. JORDAN ORGAN.

The concert organ in Jordan Hall, at the New England Conservatory of Music, Boston, represents not only a product of the organ-builders' art which is not surpassed in this country, but is unique in its method of selection. Messrs. George W. Chadwick, musical director of the Conservatory, Henry M. Dunham, composer and teacher, and J. Wallace Goodrich, organist of Trinity Church, Boston, were appointed a committee to prepare specifications for such an instrument as would fill every requirement and desire. Having in mind the ultimate fitness of the instrument for concert work and its use with orchestra and chorus, as well as the prestige which such an organ would give the Conservatory in this and other countries, the committee determined to provide an instrument which might stand as a model in every detail in specification, action, voicing and general mechanical construction.



Main Entrance: New England Conservatory of Music, Boston.

Attention was first of all given in the plan of the hall to the necessary accommodations of the organ. A space, wide and not too deep, with ample height, was selected at the rear of the stage. To insure against dampness, this space was properly sealed and provision made for thorough ventilation. The Hutchings-Votey Organ Company, builders of the organ for Woolsey Hall, Yale University, were chosen to construct the organ. The large number of church and college organs which this concern has built deserves more than passing attention. Mr. George S. Hutchings, President of the Company, has probably done more during the past quarter of the century toward the development and perfection of pipe-organs both mechanically and tonally than any other individual. The conferring of the honorary degree of A. M. upon him by Yale University, at its last commencement, establishes a precedent which might well be followed in other lines of skill.

The exterior of the organ is elaborately finished in gold. It is of the Italian Renaissance style of architecture and many of the details remind one of the organ-case of Sta. Maria de la Scala, Siena, Italy. The portion below the belt on which the front or display pipes stand is of simple panel-work; the upper portion which forms the framework of these pipes is more elaborate. The four great pillars and the heavy entablatures which they support give the exterior a squareness of outline which is a distinct feature of the Italian Renaissance, and serve to divide this portion of the case into three sections, the centre section being the widest. These three sections have heavy arched tops and are subdivided into smaller divisions by smaller pillars and cornices. The tops of the pipes are kept clear of canopies and arcades.

The key-desk of the organ is not built in the case, but is constructed in front of the stage, 50 feet away, and the organ played from this distance. The exterior of the desk harmonizes with the color-scheme of the hall. The fittings are of mahogany. The proportions and details of the key-desk show extreme care and reveal the long experience necessary in producing a result both practical and artistic. There are three banks of keys, the pedal key-board being concave and radiating, a form derived from the natural movement of the feet in playing and used rather exclusively in Europe A glance at the names of the stops shows plainly the exceptional judgment used in their selection. There is a marked absence of stops of the Mixture variety, which, while adding to the number of pipes in the organ, rather decrease than increase the harmoniousness of the organ. The preponderance of 8-foot stops is very evident. The various devices for bringing on whatever stops are desired without touching the stops themselves are carried to a greater perfection in this organ than has ever before been attained. In addition to the piston combinations of the manuals, are pistons operated by the feet, the stops effected by these pistons being optional with the player.

The advantages of electric-action have already been hinted at in the detached key-desk. By means of several hundred insulated wires the various stops are drawn and the keys played instantaneously. Unlike organs of tracker action, the full power of the organ may be played without making it difficult in the slightest degree to press the keys. It is this fact which has made possible transcriptions for the organ which were formerly thought to be too difficult for execution. The bellows of the organ is supplied with air by means of a Sturtevant pressure-blower, propelled by a five horse-power electric-motor made by the General Electric Company.

That the organ is all that was expected of it cannot be gainsaid. The educational value of the instrument is not only of local importance, but to the hundreds who go yearly from the institute to the various parts of the world, the organ will be associated with the work of the Conservatory. To Boston, the importance of the organ is especially great because so many of her musicians are trained at the New England Conservatory of Music. And to the musical public is offered another opportunity of hearing an organ constructed as those at Symphony Hall and Trinity Church, perfect in mechanical details, satisfying in tone, constructed with its specific purpose in view.

SEATING.

The American School Furniture Company furnished the opera chairs for the auditorium and lecture-room of the New England Conservatory of Music building. The chairs have

noiseless ball-bearing seat hinges. They are patterned in the modest good taste of the Colonial ideas, are beautiful in their simplicity and classic in their lines. Our illustration cannot express the harmonious coloring effects. The chairs in the main auditorium are a product of the Grand Rapids factory of the Company and of the type catalogued "911 B," and those in the Lecture-room or small Auditorium are from the Thos. Kane & Co. Works, of Racine, Wis., and No. 100, with writing-shelf pattern.

Many theatres, churches and public halls throughout the country have been fitted with chairs by this Company. Its furniture is preëminently high-art furniture, and in opera-chairs seemingly the highest pinnacle has been reached.

With sales offices in Boston, New York and Chicago, and its various plants, the American Company is in position to handle business in any section of the country without a moment's loss of time; its arrangements for expediting the filling of orders, and the meeting of customers personally at any point, are as nearly perfect as is possible; and these, together with the enormous facilities of the Company for doing its work, enable the management to meet usual and unusual demands satisfactorily to its patrons.

DECORATING.

THE firm of L. Richmond & Co., Brockton, Mass., did the interior decorating at the New England Conservatory of Music Building, and it has met with the highest sort of praise from architects and artists who have visited the building; the dull, soft Roman gold lines and clear colorings of the walls, together with the soft brown and tan shades, giving an effect entirely differing from that shown in any other public building in New England. Messrs. Richmond & Co., however, have had a sufficiently wide experience in their work of painting, decorating and hard-wood finishing, throughout the Eastern States to be able to produce, as they have in this and other instances, work of high character and original in conception.

MARBLE WORK.

To the Columbian Marble Quarrying Co., of Rutland, Vt., much credit is due for their part in producing the beautiful interior effects in the New England Conservatory of Music building. The work here is, however, only in keeping with that which this Company has done in many other places; namely:—

Essex County Court-house, Lawrence, Mass.; Majestic Theatre, Boston, Mass.; Library of Congress, Washington, D. C.; Stock Exchange, Chicago, Ill.; Hon. Chas. N. Fowler's residence, Elizabeth, N. J.; and in many other prominent public buildings, residences, etc., throughout the country. The New England Conservatory of Music is a strong addition to this list.

This Company since completing their work in most of the above-mentioned buildings and with the steadily-increasing business which their faithful execution of contracts has brought about, have been compelled to alter their method of placing their goods on the market in this territory. Instead of by a local agent, on a commission basis, orders are now receiving attention through their office at 186 Devonshire St., Boston, which is being maintained as a branch office of their main offices and mills at Rutland, Vt.

SOUNDPROOF PARTITIONS.

THE following account of tests made by Prof. C. L. Norton of the Massachusetts Institute of Technology for Mr. Edward T. Barker, architect of the *dormitories* of the New England Conservatory of Music, will

Auditorium Chair: N. E. Conservatory of Music, Boston.

show the relative values of some of the typical partitions as soundproof separations between rooms:—

There were built upon the concrete floor of the B. & A. warehouse, East Boston, fire-rooms 7 feet square, whose side walls were made of the several partitions. The rooms were built upon a floor of the same kind as that which is to be used in the buildings for the students of the Conservatory, for which the results of these tests were especially desired.

The rooms were built near one another on the fifth floor of the warehouse, in a large loft or room about 50' x 70' long and 9 feet high. The ceiling of each room was the under surface of the concrete ceiling of the large room. Each room had a floor of two thicknesses of seven-eighth-inch floor boards, with *two* thicknesses of Cabot's Sheathing Quilt between the floor boards and the concrete slab of the main floor. On one side of each room was a door with a glass panel, the door-jambs being faced with soft felt, and the bottom of the door was fitted with a stop or "weather strip," operated when the door closed, making a tight joint at the bottom.

The side with the door will be referred to as the front in the following description.

Room A.—This room was submitted by the National Fireproofing Company, and its four sides were made of terra-cotta blocks. The front and back walls were made of blocks 4 inches thick; the sides of 2-inch and 3-inch blocks. After the blocks were in position the room was given two coats of plaster inside and out.

Room B was submitted by the Keystone Block Company, and its four walls were made of the blocks of the Keystone material, of the nature of plaster-of-Paris, with a fibrous bond. The front wall was of blocks 4 inches thick, and the left side was of blocks 2 inches thick, the back of blocks 3 inches thick, and the right side of two 2-inch blocks, with a 2-inch air-space between them. The entire room was given two coats of plaster inside and out, except the front, which had no plaster on the outside of the blocks.

Room C was submitted by the Sackett Wall Board Company, and was built of Sackett plaster-board $\frac{1}{2}$-inch thick, wired upon both sides of 3-inch steel channels. The channel truss or studs of the back and right side were wrapped with felt about $\frac{1}{8}$-inch in thickness before applying the plaster-board. The Sackett plaster-board is a composite board of alternate layers of paper and plaster, the whole being about $\frac{1}{2}$-inch thick. This room, like the other, was plastered inside and out, but to a slightly less thickness.

Room D was submitted by J. Russell & Co., and was of a more complex construction. The left side was a solid partition of metallic lath and plaster. The $\frac{3}{4}$-inch steel ties were spaced 16 inches on centres, metal-lath was applied to one side only of the ties, and then plastered to a thickness of 2 inches. The rear wall was built upon two rows of $\frac{3}{4}$-inch studs, staggered. Between them was placed one thickness of waterproof paper about $\frac{1}{32}$ inch thick, and metal-lath was wired to both sides of the row of studs and given two coats of plaster. The right side was of the same construction, with a layer of $\frac{1}{8}$-inch felt between the two thicknesses of waterproof paper. The front wall was of metal-lath on two rows of staggered studs, with Cabot's seaweed quilt between the rows of studs.

Room E was submitted by Mr. Samuel Cabot, and was wholly of metal-lath and plaster double partitions, with the space between the lath filled with Cabot's Sheathing Quilt. The front and left sides contained three thicknesses of quilt, and the right side and rear two thicknesses. The quilt was placed between the studs and the metal-lath, and where three thicknesses were used, one was between the row of studs as well.

Vestibule: N. E. Conservatory of Music, Boston.

The rooms had been vigorously dried for several days, none longer than a week, but the whole building was so damp and the time so short that no considerable part of the plaster and none of the interior portions of the partition were dry. The Sackett-board room was the driest, and *Cabot's was the least dry.*

The preliminary trials showed so great a range of efficiency of the several constructions, that the microphonic apparatus, which was designed to make rapid comparisons of sound-intensity possible, could not be used. Reliance had to be placed wholly on listening with and without a felt-mouthed stethoscope at the outside of the partition to

sounds of various quality and intensity from within. The notes of the piano, violin, cornet and the human voice were carefully tried throughout wide ranges of pitch and intensity. The performers and the instruments were interchanged; every possible chance of unfairness, due to the variations of intensity in the sounds used, was eliminated. Of course, no interchange of the positions of the room was possible. No electrically-driven tuning-fork could be used for producing sounds of constant loudness. The insulating property of some of the partitions was so good that not even the blare of a cornet or the overpowering tones of an Italian tenor, drawn from the ranks of the laborers on the building, could be heard through the partition, except by careful listening within a few inches of the wall.

After much consideration, the writer has given the following ratings to the different partitions. The order of their standing upon the list indicates their efficiency as compared with those above and below them.

APPROXIMATE EFFICIENCY ON ARBITRARY.

No.	Room.	Side.	Scale.	Composition.
1	E	Left	100	Cabot's Quilt, 3 thick + metal-lath.
2	E	Right	95	Cabot's Quilt, 2 thick + metal-lath.
3	E	Rear	95	Cabot's Quilt, 2 thick + metal-lath.
4	C	Rear	85	Sackett Board, 2 felt on ⊏s.
5	C	Left	85	Sackett Board, 2 felt on ⊏
6	C	Right	80	Sackett Board, 2 felt.
7	D	Rear	75	Metal-lath + paper.
8	D	Right	75	Metal-lath + paper + felt.
9	B	Right	60	Two 2-inch Keystone Block with 2-inch air-space.
10	A	Rear	50	4-in. National Terra-cotta Blocks.
11	B	Rear	50	3-in. Keystone Blocks.
12	A	Right	45	3-in. National Terra-cotta Blocks.
13	B	Left	40	2-in. Keystone Blocks.
14	A	Left	40	2-in. National Terra-cotta Blocks.
15	D	Left	30	2-in. Metal-lath, solid plaster.

Nothing more is to be inferred from the numerical efficiencies than that the first partition is about three times as good as the last, and that the numerical interval between any two partitions on the list merely indicates the order of magnitude of the difference between the partitions.

The partitions making up the rooms submitted by Samuel Cabot and the Sackett Wall Board Company were the most efficient; but it is distinctly to be borne in mind that no other room had so easy a test as did these, in that each of the others had one thin and ineffective side which transmitted sound to the sides adjacent to it. The thin side of the Keystone room was noticeably resonant, and plainly rendered it impossible to make a fully satisfactory test of the air-space partition. The solid metal-lath plaster partition of the room submitted by J. Russell & Co. acted in the same way in that room.

I do not believe, however, that this defect in the structures has caused any changes in the position on the efficiency list of the Cabot and Sackett rooms.

The efficiency of the Cabot quilt as a material for rendering the partition "soundproof"

is so clearly demonstrated in these tests that I recommend it for use in the partitions for which these tests were made. The nature of the material in which the quilt is encased should be carefully considered. I do not think it within the province of this report to discuss the partition from other than acoustic considerations, and as an encasing medium the most effective material is Sackett board and adamant plaster.

I would, therefore, give as my opinion that the best acoustic results would be attained by using a partition of Sackett board and plaster, with two thicknesses of Cabot's quilt between the plaster board.

I should recommend a wooden stud rather than steel channels, if the fire-risk is not materially increased thereby.

As later tests showed, some sort of a suspended ceiling will be needed, as the concrete slab transmits the sound across the top of the partition readily. No trouble will be given by the sound passing through the concrete to the rooms above or below; but, unless a layer of Cabot's quilt, with under-lath and plaster, or of Sackett board and plaster, be put on the under side of the concrete ceiling, the efficiency of the partitions will be diminished somewhat.

The front walls could not be tested because of the leaks around the door and through the door frames, even where covered with a large shutter padded with Cabot's quilt. It is evident that a double glass door will be needed. The floor construction is acoustically good.

HIGH ENDORSEMENT OF THE FRINK SYSTEM OF REFLECTORS.

"Ideal Lighting in a New York church — Simplicity, the keynote of the decorations in the Second Church of Christ, Scientist, in this city, is obtained in a great measure by the method of illumination. The incandescent-lamps being concealed in mouldings and cornices, the effect produced is both mysterious and beautiful. The decorator was unusually lavish in the number of lamps he installed, yet as they are all out of sight, there is nothing to offend the eye or distract attention from the delightful scheme of color harmony. Nature has contributed — with the aid of skilled workmen — to the harmonious effect of the building, as demonstrated in the beautifully matched grain of the mahogany used in constructing the organ-loft, readers' desks, chairs and platforms. Even in the marble panels throughout the interior, the grain is perfectly matched. The auditorium has a seating-capacity of 1,400 and no shadows being caused by this mode of lighting, every portion of the room is thoroughly lighted with a soft glow, which architects and experts declare to be the only perfect plan of illumination. There is no doubt but that this is the ideal manner of lighting interiors, both in the way of illumination and beauty. For houses, there is nothing equal to concealed lights, while for use in draughting-rooms, hospitals and places where a soft uniform light is appreciated, it is the finest plan in the world." —*Bulletin* New York Edison Co., June, 1903.

This church was lighted as described above by I. P. Frink, 551 Pearl St., New York, with his system of reflectors for concealed lighting.

A VOICE FROM A CLEVELAND SCHOOLHOUSE.

I received a box of pencils
From your firm the other day;
For this kindly gift and welcome,
Sirs, accept my thanks, I pray.

Did you know the sad September,
When the summer waxes late
And the teacher's wallet reaches
Its very thinnest state?

When the car-fare is a burden
And the pencil is a stub,
And the necessary nickel —
Where to get it, that's the rub?

Whatsoever motive prompted,
I am certain that I ought
To express my satisfaction
With your very generous thought;

And I'll tell my pupils: "Children,
When you write your billydoos,
I assure you, Dixon's pencils
Are the ones that you should use."

— *M. H. P. in Graphite.*

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NOTE.

For the convenience of their customers in New York and the metropolitan district, and especially of architects and their clients, the Yale & Towne Mfg. Co. have transferred to Number 242 Fifth Avenue, their Exhibit Rooms and Contract Department heretofore connected with their General Offices, Numbers 9, 11 and 13 Murray Street. Customers are invited to avail of the improved facilities thus offered for the selection of locks and hardware for buildings of all classes. Special provision is made for the inspection and selection of artistic hardware of the higher grades. Hereafter all correspondence relating to contract work in the Metropolitan district should be addressed as above.

No. 44. *No. 44.*

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"Domical Buildings"--IX.

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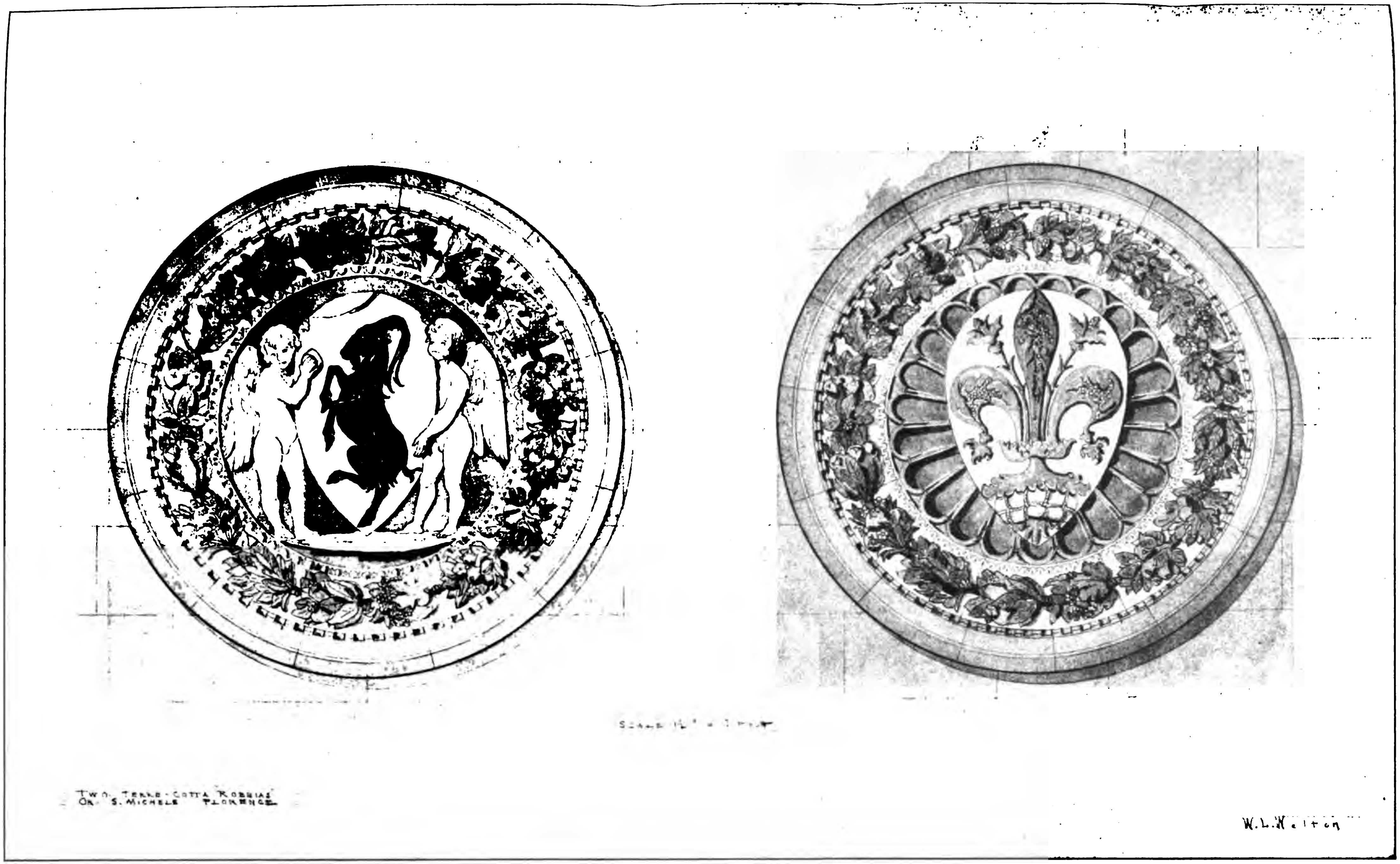

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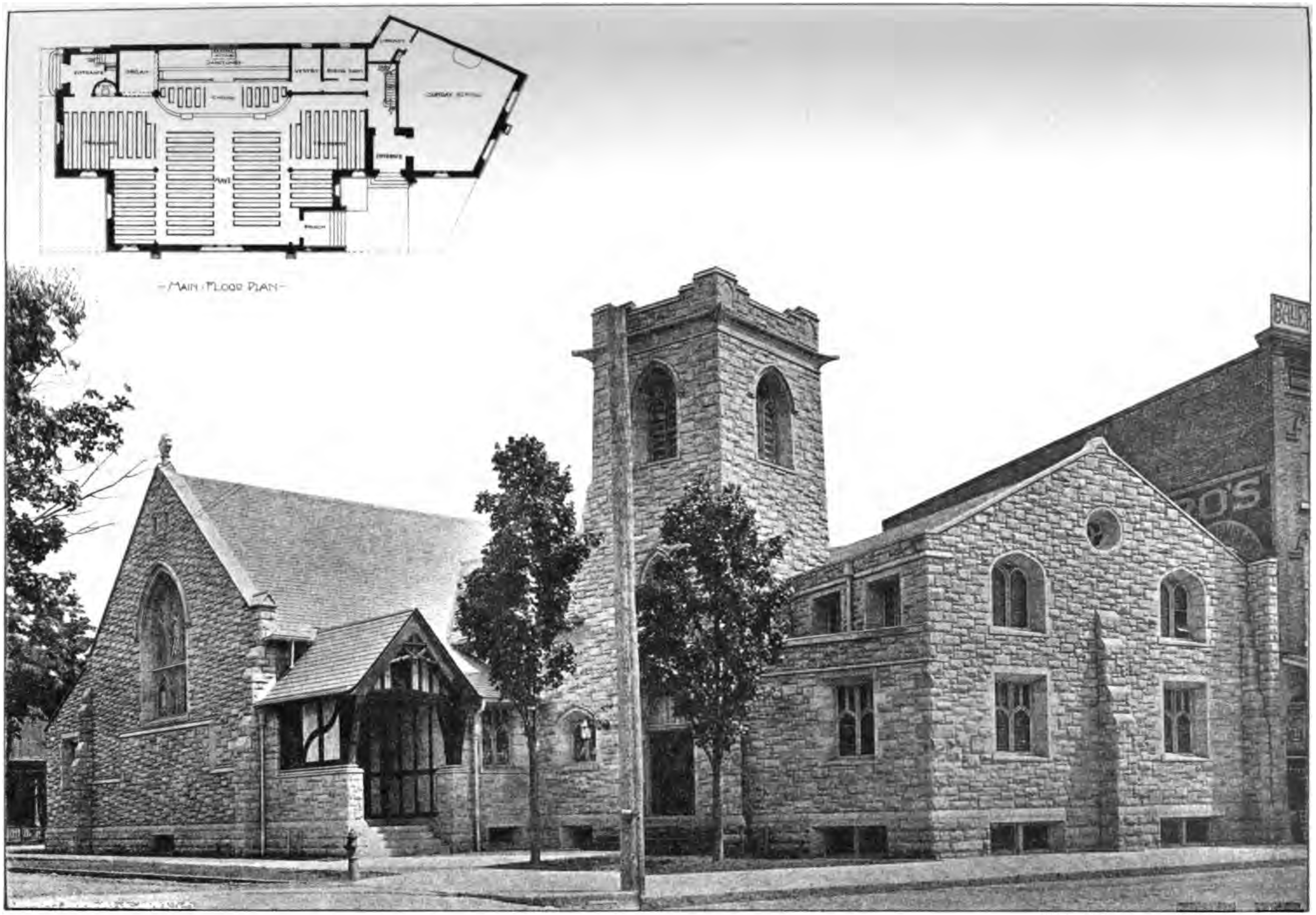

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THE AMERICAN ARCHITECT AND BUILDING NEWS

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THE Thirty-seventh Annual Convention of the American Institute of Architects will be held in Cleveland, Ohio, October 15, 16 and 17, 1903. The headquarters of the Convention will be at the Hollenden House, and members are requested to make early engagements of rooms, and to send notice of their intention to be present to the Secretary of the Institute, so that arrangements may be made for railroad tickets and other accommodations. Mr. Theodore N. Ely, of Philadelphia; Mr. Augustus St. Gaudens, Mr. John La Farge, Mr. E. H. Blashfield and Mr. Austin W. Lord, all well known to the profession, have promised to read papers.

PRESIDENT ROOSEVELT'S speeches usually gain for him increased respect and esteem from all honest Americans, and his address at Syracuse on Labor Day ought to add much to his reputation and influence. Nothing needs to be impressed more strongly upon the minds of the present generation than the principle that laws must, in a free country, be made to apply impartially to all citizens, and that laws which unduly favor the poor, equally with those which unduly favor the rich, lead to tyranny and slavery. Our energetic President, no doubt, intends to carry out his own principles, so far as he has opportunity for doing so, and he is likely to find plenty of occasions for asserting them. It is reported that Miller, the foreman in the Government printing-office, who exposed the extravagance and shiftlessness of the methods in use there, and has been savagely persecuted ever since by the union of workmen which controls the establishment, is tired of struggling, and intends to resign. Whether the report is true, or is simply started by the union leaders, as a part of their tactics for getting rid of him, we cannot say; but we trust that the President, whether Miller stays or not, will give unmistakable evidence of his determination to uphold him, and all persons like him, in doing what they conceive to be their duty. Miller, seeing that the public money was being wasted in doing work by slow and obsolete methods, said so, as every conscientious citizen should have done in his place; and did what every trusted employé is bound to do in pointing out how greater economy and efficiency could be secured in the branch of the work with which he was concerned. To allow him to be hounded out of his position by the people who betray the public interest for their own profit would be to discourage all honest public servants, while cordial support given to him will be virtually given to all those who try to do their duty in public employment.

THE new union station, at Washington, which forms a part of the general scheme for the improvement of the city, and is, in consequence, to be paid for in part out of public money, is opposed by a citizens' association, which has brought suit to prevent the appropriation of public funds for the building, as being an unconstitutional use of public money for private purposes. It seems doubtful whether this contention will be sustained. Although a railroad station is strictly a private building, it has a certain public character, and it acquires a still more public character where its design and material are regulated, as they are in this case, by the public authority, and where the regulation is the subject of a contract between the Government and the railroad companies. Meanwhile, every one will regret to have the execution of the splendid scheme of the Burnham-McKim-Olmsted Commission unnecessarily delayed.

A CURIOUS little piece of labor news is reported from a certain manufacturing city. The manager of an establishment which employed a considerable force of men in nickel-plating was notified of a "grievance," with the usual threat that, unless it was redressed, the platers would strike. The manager, being, like nine managers out of ten, a sensible man, and sincerely friendly to his workmen, replied that he could not accede to the request, but, as the consequence to the men of his refusal would be enforced idleness, prolonged until the caprice or interest of some outsider caused the strike to be called off, he suggested that the men should raise enough money to set up a little plating-shop of their own, and promised that if they could do his plating for him as cheaply as any one else would do it, he would give them all his work. The men, instead of wasting time in groaning about the "oppressions of Capital," at once proceeded to put his suggestion into effect. In a few days the necessary sum was subscribed, a shop secured, and work begun, and the establishment is now in full operation. As the people who own it find time to work in it thirteen hours a day, they have nothing to fear from the competition of shops employing men who are obliged to spend eight hours out of every twenty-four in the "recreation" so precious to the labor agitator's mind, and are making money so rapidly that only a small portion of the subscriptions to the capital have been called in, the rest being paid out of the dividends allotted to the subscribers from the profits of the business.

THE time seems to have arrived when an interesting and valuable book might be written upon American architectural antiquities. The artistic side of the matter has been pretty thoroughly treated in our own "*Georgian Period*" and other works, but there is a great deal of interesting material in the peculiarities of planning and construction of American buildings of the seventeenth century, and the early part of the eighteenth, which has never been adequately studied. Most people are far from realizing the political and commercial importance of the American colonies under the reigns of the later Stuarts and of William III. Colbert, the great finance minister of Louis XIV of France, who studied commercial conditions with unremitting zeal, estimated that in the last quarter of the seventeenth century all the maritime commerce of the world was carried on by about twenty thousand ships, of which sixteen thousand belonged to the Dutch, the remaining four thousand being divided among the Venetians, the Genoese, the Portuguese, the Spaniards, the French and the English. Colbert tried to secure a larger share of the world's commerce for the French, but the continual wars which his royal master carried on frustrated his plans, and it was the English, instead of the French, who, by building good and swift ships, sailing them skilfully, and managing them honestly, gradually wrested from the Dutch the ocean carrying trade, and gained that commercial supremacy which they still hold. In this contest the American colonists had a large share. They were at peace with their neighbors, loyal, prosperous and intelligent, and they quickly saw the use which could be made of the timber from their forests in the struggle for the ocean carrying-trade, and ships built in New England, and manned by New England sailors, carried the British flag all over the world. By the year 1700 Boston was the greatest ship-building place in the world, and the influence of its prosperity, and that of the

neighboring seaports, as Salem, Newburyport, Portsmouth, Saybrook and others, was felt in all the country around them. To this period of commercial activity, which was, soon afterwards, brought to an end by the outbreak of the French and Indian war, followed by the contest for independence, belong a great number of modest, but interesting houses still existing throughout New England. In the houses of this period the earlier "mansion" type, with its two stories, its "hopper" roof, and chimneys in the outside walls, is generally replaced by a model better suited to the New England climate, with its roof carried back, toward the north, in a long slope over the sheds and outbuildings, which protect the main part of the house from cold winds, while the front, which almost always faces the south, is furnished with two stories of liberal windows. The chimney in these houses is usually built in a single large stack, in the middle of the structure, containing flues from two, three, and often four or more fireplaces, clustered around it, and opening into the various rooms. To the house proper was usually added a range of sheds, closed at the back and end but open to the south, with wide elliptical arches, which served to shelter the woodpile, as well as to afford a roosting-place for the poultry of the establishment. This type, evolved from the conditions of the New England climate, could hardly be improved upon for its purpose, and multitudes of houses of this period have been kept in repair, and still serve as comfortable dwellings.

MANY New England houses of the end of the seventeenth century have their chimneys built of bricks imported from Holland, and easily recognizable by their small size, the dimensions of the native bricks, when the manufacture of them was begun, having been fixed, as they still remain, at a compromise between the Dutch and the English standards. Fireplace tiles were also imported from Holland, and it is probable that many other articles, such as door knobs and latches, knockers, andirons, candlesticks and fenders, were, at that period, of Dutch, rather than English or native origin. Houses entirely of brick seem to have been less common at this time than either earlier or later, possibly because the relative proportion of rich proprietors was smaller; but outside plastering was not unusual, and the coved exterior cornice, plastered underneath, which is so common in the English half-timbered buildings, is still to be seen in many New England houses, crowning a wall of shingles and clapboards. Another English fancy, often repeated in New England, is the projection of the second story over the first. The common idea is that in the crowded old towns the gable ends of the houses, which, in earlier times, usually faced the street, were projected over, so as to gain room in the upper stories, without encroaching on the street. This consideration could hardly have any weight in building a farm-house in the country, but, both in Old England and New England, it was common, two hundred years ago, to form such projections.

THE new fashion of suing individual members of unincorporated labor unions for damages on account of the antics of the body to which they belong is spreading rapidly, and promises to be an important factor in determining the fate of the present system of union management in this country. A firm of contractors in New Jersey has applied to the courts for redress against the individual officers and agents of what it alleges to be a "blackmailing conspiracy," under the guise of a trade union, which seems to have existed, like a good many other so-called "labor" organizations, for the sole benefit of its leaders. This interesting association was composed of building mechanics, and its officers kept watch of the local contractors until they found reason to believe that one of them was in a vulnerable position. Then they made a demand upon him for money, "to prevent a strike." If he was unable or unwilling to pay, a strike was ordered, and the demand increased. If the victim was still unable to raise the sum demanded, word was sent to all his patrons, or others who might think of employing him, that he was regarded with disfavor by the "union," and would not be allowed to carry out any contract that he might enter into. With each new move an addition was made to the sum required, until the unfortunate contractor either submitted or went into bankruptcy. The complainants in the present case, having suffered from manœuvres of this kind, determined to see what the law could do for them, and multitudes of contractors, who have suffered in the same way, but have been afraid to tell of their wrongs, will await the result with interest.

THE chances are that the members of the "union" will be found without property to satisfy a judgment; and, on taking the poor-debtor's oath, the defendants will be set free to plunder other people in the same way. It is, in fact, in this that the gravest danger of unionism, as at present carried on, lies. In this country, the man who takes care to have no attachable property can live in luxury upon the fruits of blackmailing, swindling and robbery, without being inconvenienced by his victims, and an incentive is thus furnished for the members of the great majority of trades-unions to spend all their money as fast as they get it, which slowly, but surely, is forming a vast community of paupers, ready, when the occasion comes, to follow a leader like Parks, or Devery, or Bryan, into the wildest excesses.

TOURIST architects should make a note to take an excursion into Apulia on their next trip to Italy. The recent movement toward supplying the country on a great scale with water for irrigation has called attention to what has been, even for Italians, an almost unknown region. It must be remembered that in Apulia, Calabria and the so-called "Basilicata," with the mountainous portions of Sicily, are probably to be found the purest existing representatives of the Greek races. In Greece itself, although the language survives, the population has been so mingled with successive hordes of Sclavonic and Celtic invaders that archæologists are unable to determine what the real Greek type may have been, or whether the fair-haired inhabitants of the Laconian mountains or the dark-complexioned dwellers on the seacoast, are nearest in blood to the heroes of Thermopylæ and Salamis. In Magna Græcia, on the contrary, especially in the mountainous and desert Apulia, the Hellenic colonists of twenty-five hundred years ago have been left almost undisturbed. They have been successively subjects of the Romans, the Goths, the Byzantines, the Normans, the Spaniards and the French, but none of these people have cared to settle among them. To this day Greek is said to be spoken in some of the mountain villages of Apulia, as it is in certain communities of Sicily; but Sicily may, like Corsica, have received from Byzantium, in comparatively recent times, a Greek element which would be less important in Apulia. Architecturally, Apulia has little to show in the way of important buildings, but the ordinary houses are of a very curious type, having commonly a flat roof, supported by a domed vault, similar in construction to that of the Syrian houses, but with the difference that, in Apulia, the dome does not show on the outside. Most of the houses are two stories high, and one of the arches of the dome is often built through the front wall, forming a sort of relieving arch over the second-story windows, while a stone balcony, supported on corbels, projects at the line of the second floor.

THE *Outlook*, from which the public has become accustomed to expect thoughtful and valuable suggestions, revives the idea of taxing posters, so as to restrict the use of them, and improve their quality, and we trust that its great influence may be sufficient to secure the carrying of the idea into effect. The *Outlook* thinks, speaking of the city of Lübeck, in Germany, which has passed an ordinance requiring all buildings visible from the public streets to be so designed and constructed as not to detract from the appearance of existing buildings, that this country is nearly ready for similar ordinances. We wish we could agree with its opinion, but it seems to us that even the public sentiment which would support such action, to say nothing of the adoption of regulations so opposed to our notions of liberty, is still in the most rudimentary stages. The readers of magazines in this country have, undoubtedly, some vague yearnings after civic beauty, but, so long as they can endure contentedly the sight of the average American suburb, there is no probability that their aspirations for municipal stateliness and symmetry will bring much result. Perhaps it is on account of our practice of building with wood that our suburban regions are the most hopelessly hideous in the world. A stone wall, even in ruins, has a certain respectability, and even beauty, but a decaying wooden building of the pretentious sort, with its mangy shingle roof, its dilapidated cornice, its clapboards hanging loose, and the columns of its portico standing on tiptoe on some fragments of rotten wood, is the meanest and most miserable object that architecture presents; and until the outlying portions of American cities burn up, or rot altogether away, we do not see how any general pride in civic architecture is possible.

THE NEED FOR A UNIFORM METHOD OF TESTING THE FIRE-RESISTANCE OF BUILDING-MATERIALS.[1]

THE paper which I have the honor of submitting to the Congress contains some facts which have been stated and repeated many times, and which might be passed over in silence as far as many of the members present are concerned, if there were no question but of them and their relation to the subject of fire-prevention. But these are facts which cannot be too often repeated, because we wish to formulate, as the outcome of our labors, certain resolutions to be transmitted to the various governments, municipalities and institutions which have sent delegates to this Congress. All the desiderata capable of exercising a favorable influence on the ends which we seek should therefore be reviewed in order that conclusions may be drawn from them which shall necessarily carry conviction. Unfortunately it must be admitted that the very slow rate of progress in the application of fire-preventive measures has hitherto been most discouraging to those who, like the members and honorary corresponding members of the Fire Prevention Committee, know how many good methods and systems exist for saving from fire so large a portion of the public wealth, and that it is from lack of a judicious and rational application of these methods that we witness the occurrence of irreparable catastrophes in which not only immense riches are destroyed, but also large numbers of human beings lose their lives.

It is for you, gentlemen, to declare the causes leading to this state of affairs, injurious to the whole human race.

For my own part, I might content myself with reproducing here all the arguments on the subject that I have already urged in my various lectures, pamphlets and articles in the technical press, but this would be rather long and our time is limited, hence I will merely enumerate them: —

In the first place should be stated the principal cause, (1) the indifference of Governments in general, who to a very great extent leave it to each district to organize its own fire-preventive and fire-brigade services, alike for prevention and extinction of fire, and encourage but little, or not at all, individual initiative in the matter of salvage and the preservation of existing property.

(2) The inadequacy of building laws and regulations and of the rules for the handling, storage, etc., of dangerous materials, as also the by-laws dealing with special risks.

(3) The incomplete education of our engineers and architects in the direction of fire prevention, the inability of the members of these professions generally to draw up suitable specifications for insuring the security of the buildings which they are called upon to erect, and the need for the establishment of a supplementary course of study in preventive measures and the fire-resistance of building-materials in our technical education schemes.

(4) The too elementary training of a large number of fire-brigade officers, both from their own professional point-of-view, and that of the *fire-preventive* measures regarding which they should be able to influence their fellow-citizens in the right direction.

(5) The inefficient organization of the fire-insurance service, which should work hand in hand with the fire-preventive and fire-brigade services. The one should serve as complement to the other, whereas nowadays we often see them in opposition, to the detriment of the obvious interest of the general public.

(6) The indifference, carelessness and ignorance of employers of labor and the general public with respect to what is clearly their interest. I might add the parsimony of many public authorities, and of owners of property, who can spend enormous sums on matters of luxury and ornament in erecting factories, hotels, large edifices, etc., and yet grudge the addition of the few hundred pounds necessary to secure the protection and preservation of property, not to speak of the lives therein contained.

(7) The lack of data as to the fire-resistance of building-material, owing to the want of the necessary number of testing-stations in different parts of the world, well-equipped, financially strongly supported, and employing a uniform method of investigation.

Naturally I lack the time to develop here the different reasons that I have just enumerated, and which must serve merely as a preliminary matter to the object I have in view, namely, to speak to you about the last of my seven reasons.

Fire-tests have been held more or less in all countries, but it must be admitted that most of these tests have been very imperfect and have not afforded the indispensable guaranty that we have the right to demand to-day, when in every region of human activity the means of investigation have attained such wide developments.

These tests have formed the subject of detailed reports, more or less complete, more or less serious, but always lacking that stamp of authority which belongs to certificates issued by establishments officially organized or at least officially recognized.

I see no necessity for enlarging at this moment on the tests which have taken place in Belgium. The most important of these were conducted under my supervision, and form the subject of detailed reports, one of which I am submitting as an appendix with the present paper.

Those who read them attentively will find in them the proof that in Belgium, for want of equipment and instruments *ad hoc*, we were compelled to act on an approximate procedure, absolutely inadequate, I repeat, for any person wishing to make a thorough study of the question. What has been done in Belgium has been repeated in many countries, but I will not deal further with this point.

Comprehending the comparative worthlessness of such isolated and unsystematic efforts, a body of practical men, mainly civil-engineers, surveyors, architects, builders, public officials, etc., formed themselves into a society, one of the primary objects of which was to organize an establishment for tests and investigations, which should answer the requirements of practical men. I here refer to the British Fire Prevention Committee, whose useful work many of you, like myself, have followed with great interest. One need only glance at the seventy-three booklets issued by the Society since its foundation in 1897 to be convinced how industriously it has worked.

Those who, like myself, have several times travelled across the Channel from Belgium to attend some of the tests carried out by the Committee, are aware how carefully the tests are made with the desire of informing the public as accurately as possible of the worth of the articles or systems submitted.

That nothing is open to criticism I hardly think, but, all things considered, this Committee's testing-station constitutes an immense advance as compared with the old methods.

With a few insignificant modifications in the procedure, and the arrangements as to the cost of the experiments — which, though costly to the tester, still leave the Committee with a considerable deficit — the tests and the reports would be perfect.

In short, it is to be wished that every country had a similar testing-station under such competent guidance.

The Committee has recently collected in two volumes the greater part of the reports on tests carried out at the station. By arrangement with the learned and distinguished chairman of the Committee, whom you all know, I have executed a French translation of this work. It will shortly, I hope, be published, and enable those unacquainted with the English language to gain a knowledge of the activity of the British Fire Prevention Committee and the real services which it has rendered to the cause we support.

The experiments which the Committee invite us to see on the occasion of this Congress will, I am sure, still more convince you of the utility of such an institution without my further emphasizing the point.

[1] A paper by Commandant Welsch, C. O. Fire-brigade, Ghent, Belgium, prepared for the International Fire Prevention Congress, held in London, Eng., July 6-11, 1903.

THE MYSTERY OF RADIUM.

LAST March the *Times* announced the discovery by M. Curie of the astonishing fact that radium, in addition to the radio-active properties rendered more or less familiar by the researches of M. Becquerel on uranium, possesses the property of maintaining its temperature at a point three degrees higher than that of its surroundings, and of continuously emitting heat without any apparent diminution of bulk or alteration of physical constitution. This announcement was received with great incredulity. Eminent men of science refused to accept a statement so irreconcilable with scientific experience, and maintained that there must have been somewhere a serious error of observation. That radium possessed radio-active properties indefinitely more powerful than those displayed by any other body was a fact of an order to which we were accustomed. These properties, however remarkable, differed only in degree from properties with which the scientific world was familiar. That difference in degree has indeed become sufficiently astonishing in the light of further study, for it has become clear that radium without external stimulus can produce effects hitherto only obtainable by means of electric-discharge in high vacua. It can throw gases into that state of vibration which causes the production of their characteristic spectrum, and it emits at the same time a radiation resembling the Röntgen rays, and producing like them marked physical and physiological effects. Superadded to this extraordinary development of powers not unfamiliar in their lower manifestations, is the unique and unprecedented power of emission of heat, which is now established beyond all possibility of question. That gross physical effect, in addition to the radio-active and physiological effects produced on so large a scale, points to an amazing total output of energy for which no compensation has yet been discovered.

Strenuous efforts have of course been made to obtain accurate measurements of the heat production, and to determine the effect of external conditions in promoting or retarding it, M. Curie has just communicated to the French Physical Society a paper stating the results of a recent inquiry. It appears that at the time of his lecture at the Royal Institution in June, the resources of that laboratory in producing the manipulated liquid gases were utilized in a new series of experiments. Professor Dewar had already in 1893 improved the calorimetric use of liquid gases by means of a combination of vacuum vessels so that heat-evolution at the temperature of boiling liquid-air or hydrogen could be determined with accuracy. When a sample of radium bromide weighing .7 gramme was tested in this way it was found to be capable of volatilizing an amount of liquid oxygen and hydrogen equivalent respectively to 6 c. c. and 73 c. c. of the gases measured at the ordinary temperature. It seems that through a very wide range of temperature the thermal emission remains unchanged. Whether at the temperature of a summer day or at that of liquid-air, the emission of heat goes on without perceptible variation. When, however, we make a long, downward stride from liquid-air to liquid hydrogen, radium shows that it is not always unaffected by external temperature. Within a comparatively short distance of the absolute zero a change occurs in the rate of heat-emission, but not in the

direction that might be anticipated in view of the effect of low temperatures on ordinary chemical action. Instead of being reduced, the emission of heat, so far as present data can be relied on, is augmented at the temperature of liquid hydrogen. Whatever be the nature of this extraordinary phenomenon, it only increases in intensity at a point where all but the most powerful chemical affinities are in abeyance. The evaporation of a liquid gas gives an absolute measurement of the amount of heat given off by radium. Changes in the degree of radio-activity may escape the most careful observer, or may be imagined where they do not exist, but the quantity of liquid hydrogen which a given mass of radium converts into gas in a given time can be easily measured with an accuracy which is beyond cavil, and the amount of heat required for the conversion can be ascertained with great precision. Hence there is no longer any doubt either of the quantity of heat evolved by radium or of the fact that the rate of emission is apparently greater in liquid hydrogen than at any temperature from that of liquid air up to that of an ordinary room.

At the beginning of these experiments in liquid hydrogen a contrary result appeared to emerge when the low-temperature thermal measurements were compared with the early Curie values observed at the temperature of melting ice, as formerly given in the *Times*. This led to the curious discovery that a freshly prepared salt of radium has a comparatively feeble power of giving off heat at all temperatures, but that its power steadily increases with age until about a month from its preparation, when it reaches the maximum activity, which it afterwards maintains apparently indefinitely. A solution of radium salt behaves in exactly the same way. Its power of heat-emission is at first relatively low, but goes on increasing for about a month, when it becomes equal to that of the solid salt, and so remains. These remarkable results throw no light upon the process by which radium maintains its constant emission of heat and radio-activity, but they will have to be accounted for by any theory that may be constructed. — *Times*.

A letter from Sir Oliver Lodge, F. R. S., was printed in the *Times* of August 17, in which he writes: —

"Referring to the article in your issue of the 13th inst., it may be pointed out once more that all the known properties of radium are consistent with the hypothesis that a rearrangement of parts is going on inside the atom, and that it is not a case of chemical action in the ordinary sense at all. There is no difficulty in accounting for the energy in this way." — *Journal of the Society of Arts*.

THE GOVERNMENT AND THE ENGINEERING SCHOOLS.[1]

PROBABLY no other single act has done more to advance the possibilities of engineering education than the bill introduced into Congress by Hon. Justin Morrill, of Vermont, and commonly known as the Land Grant Bill. The original bill introduced in 1858, was vetoed by President Buchanan, but in 1862 Senator Morrill again presented the bill, and on July 2 President Lincoln's signature made the bill a law.

Times were hard; the country was in a state of confusion and uncertainty; the interpretation of this law as passed was different in various States, and many sad mistakes were made during the history of the founding of these institutions. The conception was in itself wonderful, and, in spite of many serious mistakes on the part of the different States, a new era was opened to engineering education by the passage of the bill. The conditions of the law were that for each senator and representative in Congress the State should receive 30,000 acres of public lands, open for sale at $1.25 per acre, or instead each State was to receive scrip to be sold for the benefit of the State. For various reasons, misunderstanding of the law, a feeling of impatience or uncertainty, trickery or bad management, nearly all of the States failed to realize the full $1.25 per acre, and the majority received but a very small portion of this amount, one State receiving as little as 41 cents per acre. One State stands as a marked exception, viz, New York. Through the wisdom and caution of Mr. Ezra Cornell the investment was made to realize between $6 and $7 per acre on all but a small portion, which had been sold before Mr. Cornell secured control at 53 cents per acre. The result was that New York State received forty-two per cent of the amount realized from the total grant from her share of scrip, which was only about ten per cent of the total. The benefits resulting from the wisdom of Mr. Cornell have been most apparent in the progress of the excellent institution bearing his name. Nine States only succeeded in securing as much as the $1.25 per acre, and of these Tennessee received the least, $1.34½. The nine States to invest to good advantage were Tennessee, Wisconsin, Florida, Michigan, Iowa, Minnesota, California, Kansas and New York, the last three receiving more than $5 each per acre. These nine States received for 2,459,950 acres the sum of $10,633,860, while the remaining twenty-nine received for 7,117,920 acres only $5,232,512. Considering this most unfortunate start, the positions occupied by the various State institutions at the present day are most flattering, as each State has since endeavored to live up to the letter of the law, and has made up the initial loss to a certain extent by liberal appropriations from time to time. The clause of especial interest in the Morrill act refers to the use of the funds derived from the proposed sale of lands and States that the income should be appropriated "to the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and other mechanic arts in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

The States accepted the responsibility and each State established its institution. In most States one institution only, including the courses in agriculture and the mechanic arts, was established, but Massachusetts made an exception, granting to the Institute of Technology, which was then coming to the front, a portion of the fund for its technical departments, the remainder going to establish the Agricultural College at Amherst. In a few States the fund was directed toward the development of the necessary departments in instructions already established. Thus came into existence a large number of colleges, the majority of which were to advance the interests of engineering education and many of which were destined to become leaders among the numerous universities of learning of the present day.

From time to time since the advent of these institutions, institutions founded by private funds have been organized, until to-day the opportunities for study in the varied lines of engineering are so numerous and of such excellent quality as far to surpass the wildest dreams of the early promoters of such education. Not alone are there modern technical institutions where these various branches form the principal courses of study, but the old conservative universities have opened their doors and are striving to establish departments of engineering that shall rival those of the leading technical institutions.

[1] Extracts from a paper by Robert Heywood Fernald, Member Engineers' Club, of St. Louis, Mo., read before the Club Feb. 18, 1903, and printed in the *Journal of the Association of Engineering Societies*.

TELEGRAPH AND TROLLEY POLES OF REINFORCED CONCRETE.

AMONG the numerous and various uses for reinforced concrete for construction of all kinds — from its use for building swimming basins and tanks, which signalled its first appearance, up to the complete construction of entire large buildings, of which at present there are in every country many prominent examples, and for all classes of public purposes, such as highways and hydraulic uses — a new feature of its application, which is the construction of reinforced concrete poles for carrying overhead wires, has lately claimed attention, and, although at present limited to only a few test cases, it promises, however, to have an extensive development, as it fulfils all the requirements of a growing demand in the industrial world.

Recently, Engineer Porcheddu, of Turin, Italy, had two such poles constructed, according to the Hennebique system, each of them being 36 feet long and having a section 13.8 by 13.8 inches at the bottom and 6.3 by 6.3 inches at the top, with a frame calculated to resist a pull of 440 pounds applied about 29.5 feet above the ground.

The management of the Upper Italian Electric Company desired to make experiments as to the resistance of this class of poles, and Engineer Porcheddu submitted for this purpose the two poles above mentioned.

In the presence of the manager and engineers of the above-mentioned company, these poles were tested until one of them broke. The following is the statement made by Mr. T. Battaglia, engineer of the Upper Italian Electric Company, on the results obtained from these tests.

The pole tested was secured in the ground to a depth of 6.4 feet, and an iron collar was placed at a distance of 23.6 inches from the top, which was about 27.7 feet above the ground. This collar was provided with a hook, to which the pulling force was attached. For the purpose of measuring the deflection of the pole a plumb-line was fastened at a distance of 27.7 feet from the ground, from which the displacement could be read off on a register placed above the soil.

DEFLECTION FROM THE VERTICAL.

Tension shown by the dynamometer.	When under stress.	After the stress was relieved.	Observations.
Pounds.	Inches.	Inches.	
265	0	0	Unsteadiness due to the irregularity of the pull.
1360	3 58	0	
1325	8 86	0	
2205	8.86	0	A horizontal crack noticed 8.2 feet above the ground.
2650	9.26	0	
3310	19 50	5.51	
4410	broke		Section of break 115 feet above the ground.

The break was similar to that which would have occurred in a fibrous substance; the upper portion was inclined about 30 degrees from the vertical. The broken end would have required a force of about 1,100 pounds to have pulled it to the ground. The splendid results obtained from these experiments were far beyond the most

optimistic expectations, and they induced the management of the Upper Italian Electric Company to invite the engineers of the provincial and municipal government, as well as railway engineers, to be present at the tests of the second pole. In the presence of many engineers, who courteously accepted the invitation, the second pole was tested, and the following results were obtained, as stated by the engineer. The size of the pole and the testing conditions were the same as for the first pole. Before submitting the pole to the test the electric resistance of the portion between the upper collar and the base was measured, and the result was found to be 40,000 ohms. Rags soaked in a soda solution were used to obtain the contact between the hoops and the cement, being placed between the same.

DEFLECTION FROM THE VERTICAL.

Tension shown by the dynamometer.	When under stress.	After the stress was relieved.	Observations.
Pounds.	Inches.	Inches.	
464	1.07	0	
927	3.35	0	
1300	5.51	0.73	Gradual slacking.
1520	7.29	0.73	
1960	10 65	0.73	
2180	14.50	1.58	Sudden slacking.
2205	14.98	2.76	Gradual slacking.
2870	15.38	2.76	
4015	29.40	2.76	
4410	broke		

After the break the point of the pole was bent down to the ground by a pulling force of about 1,100 pounds. Both poles were thus proved to be very elastic, breaking only under a pull that was about two and a half times that for which they were originally constructed. Such a combination of resistance and elasticity, together with the fact of practically no cost of maintenance, as they are indefinitely durable, evidently makes concrete poles superior to those of wood or iron, and there is no doubt of these facts insuring a splendid future for this new use of reinforced concrete. Later, two of these poles were constructed by the firm of Wild and Abegg, and at their request they were set along the provincial highway between Borgone and Bussoleno. The poles were prepared in the yard and shipped to their destination, where they were set in the ground two metres and secured in place by a layer of common cement. — *Cement.*

ARTISTS' RIGHT OF REDEMPTION.

THE Paris *Chronique des Arts* contains an interesting account of a movement set on foot by the French Society, Les Amis du Luxembourg, to provide artists with a more adequate return for their work. It is notorious that many great painters have reached old age without having earned enough to make them comfortable, and yet have seen other men grow rich upon the works which they, the painters, sold for a song in the days when it was a struggle for bread and butter and their names were still unknown. The example of Millet is cited. Most of his masterpieces cannot be bought, to-day, if offered for sale at all, for less than one hundred times what the artist received for them. Even before his death Millet saw his early pictures sold for sums that seemed fabulous to him. It is quite possible than an artist may do work while young and still unknown which he cannot approach in later years, when privation or misfortune may have robbed him of inspiration or power; the money value of his productions may rise to respectable proportions only when it is too late for him to profit. It may be some sort of satisfaction to an artist to see a picture for which he received $100 resold twenty years later for twenty times that sum, but his satisfaction would often be vastly increased could he share in the profit thus realized by someone else.

Several suggestions looking to a remedy for this apparent injustice have been made by the society in question, only one of which seems to be regarded as worthy of further consideration. The plan put forward is to give every artist the right during his lifetime to buy back any of his pictures he chooses by paying ten times what he received for them. Under such an arrangement all picture sales, unless it was otherwise stipulated, would be conditional. It might be argued that such a restriction would discourage buyers, but the buyer who might be called upon to surrender a favorite picture which had graced his walls for perhaps twenty years, would really have no grounds for complaint; he would have enjoyed the sight of the picture for all those years, and he would receive back his money with generous interest. More than that, he would have the satisfaction that comes of a good deed done. It cannot be pleasant for a man to know that while he has on his walls a painting worth thousands of dollars, the painter of it is in need of hundreds.

The objections to any such scheme are obvious. The young painter is often too glad to sell his pictures at any price to stipulate for any conditions, unless these are made obligatory upon the whole guild. Speculation in pictures is a large business that would not flourish under any scheme for limiting the possible profits. One American painter to whom this French proposal was outlined said: "It is hard enough to sell pictures now. Buyers are timid enough as it is; if we tied a string to our pictures, we might as well prepare for starvation. Every man likes to get something for nothing, or to think he is doing so. When I sell a picture the buyer is getting a great deal for almost nothing, and part of the inducement to buy is that some day the picture will be worth dollars to the buyer where he paid cents; that will show his art instinct and good judgment, and enable him to pose before his friends as a connoisseur. And, after all, we painters ought not to consider money in connection with our work. The artist's reward is in the pay he gets out of his work. If he doesn't get that, he doesn't deserve any other reward." — *N. Y. Evening Post.*

A PLEA FOR UNIFORMITY IN THE ARRANGEMENT OF BUILDING LAWS.

IT is greatly to be desired, now that cities and towns throughout the country are providing themselves with building laws, that they shall be arranged in such a manner that architects and others, consulting them for the first time, shall be able to find quickly the provisions that may apply to the particular case in hand, without the expenditure of unnecessary time. Building laws are generally so voluminous, and are often arranged in such a puzzling manner, that, even when provided with an index, it is necessary to read through the whole of the law from beginning to end, to make sure that nothing essential is overlooked.

As an illustration of the foregoing proposition, I cite the following: —

In a certain building law, under the heading "Tenement-houses" are found various provisions which apply not only to "tenement-houses" but to other classes of buildings as well: under a section dealing ostensibly with "School-houses" are found provisions relating to tenement-houses; in the chapter devoted to "Plumbing" is found an important regulation which would naturally be looked for under the general provisions of the law, and so on.

It is the object of the present essay to outline a general scheme, or plan of arrangement for building laws, which if generally adopted would result in a great saving of time to architects and others who are obliged to consult them. It is hoped that these suggestions may fall under the eye of some one who may be actually engaged in remodelling an old law or preparing a new one.

In general, the plan consists in classifying the various provisions of the law according to the purposes which they are designed to effect.

So far as is known to the writer, the various purposes for which building laws are ostensibly enacted are as follows: —

First: To insure the life and limb of the public against injury caused by the collapse or failure of structures. *Second:* To prevent the occurrence of conflagrations and to provide for the escape of occupants of buildings in case of fire. *Third:* To safeguard the public health in so far as it may be affected by unsanitary conditions in buildings. *Fourth:* To prevent encroachments of structures upon public ways or the property of adjoining owners, and to safeguard the public in their rights of light and air. *Fifth:* To promote, as far as may be considered advisable to do so by building regulations, the æsthetic improvement of cities and towns.

The proposition is submitted that any building law or regulation which does not come under one of the above headings is an unjustifiable interference with private ownership.

Following the classification above given, the natural arrangement for all building laws would be as follows: —

DIVISION I.

Provisions governing the administration of the building law:

1. Jurisdiction of the building law.
2. Definition of technical terms.
3. Organization of the building department.
4. Duties of the department.
5. Board of appeal.
6. Filing plans and taking out permits.
7. Penalties.

DIVISION II.

Laws designed to insure the life and limb of the public against injury caused by the collapse or failure of structures:

1. Quality of materials to be used in structures.
2. Data to be used in determining the strength of materials and in computing the sizes of structural members.
3. Precautions to be taken in making excavations for structures.
4. Design and construction of foundations.
5. Thicknesses prescribed for masonry walls and specifications to be observed in their construction.
6. Regulations concerning strength of floors.
7. Specifications to be observed in structural work of wood, such as framing of floors, construction of columns, trusses and other details.
8. Similar specifications for structural work in iron and steel.
9. Precautions to be observed in the installation of elevators and lifts, with requirements for safety appliances.

DIVISION III.

Laws designed to prevent the occurrence of conflagrations and to provide for the escape of occupants of buildings in case of fire:

1. Specifications for fireproof construction.

2. Cases in which fireproof construction is required.
3. Restrictions of height of buildings in certain cases.
4. Restrictions of area in buildings in certain cases, by the use of intercepting fire-walls.
5. Provisions regulating the distance between buildings in certain cases.
6. Provisions requiring fire-stops in certain cases.
7. Precautions to be observed in the construction of chimneys.
8. Precautions to be observed in the installation of heating and cooking apparatus.
9. Precautions to be observed in the construction of vertical shafts in buildings, such as elevator-wells, dumb-waiter shafts, ventilating-shafts and the like, for the purpose of diminishing the vertical hazard.
10. Specifications for the construction of intercepting fire-walls, and requirements concerning the use of fire doors and shutters in certain cases.
11. Increase in thickness of masonry walls required in certain cases, over and above what might be required for stability alone.
12. Requirements concerning means of egress from buildings in case of fire.
13. Specifications for the construction of fire-escapes.
14. Special provisions for theatres, school-houses, tenement-houses and other buildings of a public or semi-public character.
15. Special restrictions governing the erection of wooden buildings or non-fireproof buildings of any sort.
16. Installation of gas-piping.
17. Installation of electric wiring.

DIVISION IV.

Laws designed to protect the public health in so far as it may be affected by unsanitary conditions in buildings:

1. Plumbing regulations.
2. Restrictions concerning stables.
3. Regulations designed to ensure proper light, air and ventilation to the occupants of hotels, tenement-houses, school-houses, and other buildings of public or semi-public character.
4. Light and ventilation of water-closet apartments.

DIVISION V.

Laws designed to safeguard the public in their rights of light and air:

1. Limitation of the height of buildings.
2. Restrictions governing the projection of cornices, bay-windows and other constructions.
3. Restrictions governing the slope and height of roofs, chimneys and sky-signs.

DIVISION VI.

Laws concerning the maintenance of buildings:

1. Numbering of buildings.
2. Regulations as to coal-holes.
3. Use of elevators and lifts.
4. Regulations as to the care and maintenance of fire-escapes.
5. Depositories for ashes.
6. Regulations as to distribution of loads on floors.
7. Provisions for night watchmen in certain cases.

The classification outlined above is not intended to be complete, but is submitted as a logical and practical scheme for the construction of a building law. It is the result of a careful study by the writer of the law of a certain Massachusetts town, and in this case it was found entirely possible to rearrange the law according to the above scheme. Only in the case of a single provision was there any question under which heading it should be placed.

It is suggested that any existing building law, in whatever manner originally printed or arranged, could be provided with an analytical "Table of Contents," based on the classification given above, which would be much more serviceable to one consulting the law for the first time than the most voluminous alphabetical index.

WM. ATKINSON.

SOME WARNINGS.

IN his inaugural address on "The Consulting Engineer" before the City and Guilds Technical College, Dr. Alexander B. W. Kennedy, F. R. S., closed with the following admonition, which is as applicable to architects as to engineers: —

"There are still two or three matters about which I would like to speak to you, although it is with some hesitation that I do so. It has happened in late years, especially in connection with electrical work, that a great many very young men have been fortunate enough to get into positions of considerable responsibility, with the drawback that, in the nature of things, they have not had that knowledge of engineering procedure and that knowledge of the world which is only to be bought by the misfortune of old age. I am afraid that in some cases the want of experience has led to undesirable results. In the first place it is a very dangerous thing for you to own any patents in your own line, no matter how ingenious they are, if you are going to take to consulting work. You cannot put a patent of your own in your specifications, and you cannot use it at all without disagreeable things being afterwards said. If you are going to advise the use of things to other people you cannot, as professional men, advise the use of things out of which you are going to make money, and it is very undesirable on many grounds, therefore, that you should be the financial owners or the beneficial owners of such patents. Of course, if you are the engineers to works the matter may be different, although in every case it requires to be definitely arranged with your directors; but if you are general consulting engineers it is most undesirable for you to have patents in your own line.

"If you are consulting-engineers also you have absolutely no business and no right to be interested in any way whatever in any manufacturer's firm from whom you can possibly buy anything. Many of the manufacturing concerns are limited companies, and sometimes it may be very tempting to take up shares in them when you know that their work is good, but clearly it would not do for anybody who was going to specify work to be a shareholder in a firm who might possibly tender to his specification. However free from prejudice your mind might in fact be, it is necessary for you not only to avoid wrong, but also to avoid even the appearance of it.

"There is yet another matter which perhaps I ought to mention. There is a very strong temptation to a young man conscious not only of his own merits and ability, but conscious also that he wants to get married and to make money, and that as yet he is known to but few people, to, in one word, tout around for business. That is a thing which must not be. There is, unfortunately, no definite rule, as in the legal and medical professions, against it, but everybody who has done so will be sorry afterwards. It is, of course, a very undesirable thing that business should not come your way, but should go to some other fellow who is not nearly so clever or virtuous as you are. I hope that such experience will not be yours; but even at the worst, you will find it the best policy in the long run (to put the matter on the lowest basis) to do nothing in your own profession which would not be tolerated in any of the other great professions with which we wish to feel ourselves on an equality."

SOME TROUBLES OF THE EXPLORER.

PROFESSOR FLINDERS PETRIE says in the London *Times*: —

"Unhappily, the growing lawlessness of Egypt, which Lord Cromer noticed in each of his recent reports, has affected our work, and 'a large number of offences, not very serious in themselves, but which cumulatively become serious, have been committed, and but too often have been committed with impunity.' (Report, 1902, p. 40.) A statue was stolen from my house; and though the footprint of the thief exactly agreed with the very peculiar foot of one of the men who were notoriously accused in the village, and all the links were named by witnesses, yet no conviction could be obtained; £35 are said to have changed hands as bribes over this. Next, my workmen from Quft were subject to a general conspired assault in the market, and each robbed of his money at once. But no redress whatever could be obtained. The police officer added to the injury by taking away one man who had been beaten to see the doctor, who did nothing but detain him till he paid 10s. bribe to be let go. Last year the relations of a man who died of fever were mulcted of £6 by another doctor; and, on my complaining, the official inquiry resulted in giving an account which was absurdly false, to my personal knowledge.

"It is impossible that the present machinery can work to elicit the truth. Witnesses are examined by petty officers, who dictate the final statement of evidence at their own will; and the witnesses are summoned, through their sheikh, who is the first man to be 'squared' by the offenders, and, 'who, they think, will assuredly sooner or later endeavor to wreak his vengeance on them.' (Report, p. 36) Such a system, dating long before the British occupation, is the most perfect for facilitating bribery and the suppression of truth. This is not the place to discuss the remedies. Happily Lord Cromer considers that 'the points which most require attention are the police, the Department of Justice and sanitation.' I do not touch on more personal threats to our party and being fired at, as I only wish here to refer to the failure of justice. But matters have gone so far that we must look for safety to our own resources rather than to the law, which has in each case proved to us useless."

BOOKS PAPERS

HOW in the world can all the illustrated reviews pay, except by their advertisements, and how can the advertisements pay the advertisers, as the circulation of such reviews must be limited? The *Burlington Magazine* is a marvel which suggests the above queries, to which another question that occurs to the mind of the writer may be added: How many persons can afford to give ten guineas a year for the twelve monthly parts printed on hand-made paper with special plates, and bound in Japanese vellum? Of course there are multitudes of millionaire connoisseurs nowadays, but so are there multitudes of art books — they grow like mushrooms. But does art culture increase? Judging from the tip-top exhibitions, No; only,

of course, we must take into consideration that Academicians may not be able to invest in artistic publications, even though their fellows help them, through the Chantry Bequest, to obtain 1,000 guineas (or 2,000 guineas was it?) for pictures of models clad in stage armor made of cardboard and gilded with Dutch gold.

The printing of the *Burlington* is of the type so much beloved of William Morris. Is it handier to read than the best modern type? And does the division of paragraphs by a ¶, *à l'antique*, instead of by a new line, add to the ease of the reader? Is not this a fad akin to rough edges? But the substance of the review is good; it is more thorough than that of the *Connoisseur* which appeals to the mere amateur collector. As to whether the reproductions of pictures, etc. are superior is doubtful — those in the August number of the *Burlington* are certainly no better than some in the earlier numbers of the *Connoisseur*.

The articles upon the Winchester College plate and the Somerby pictures are very excellent and exhaustive, and the reproductions of Reynolds's pictures of the Cardinal and the Theological Virtues are very beautiful. They were painted as designs to be reproduced upon glass for the great window at New College, Oxford. Unfortunately the glass-workers of the day knew nothing of that art, and consequently the designs are mere paintings upon glass. If the visitor looks at the other windows of the chapel he will see fine work of an earlier date (fifteenth century), excellent examples of what painted windows, as people say, ought to be; *i. e.*, stained glass, transparent and translucent.

In the current number of the *Architectural Review*, there are some photographs of Stevens's model of the horse and rider upon the Wellington Monument as seen from all sides; the result being, condemnation of the design. Knowing what a great sculptor Alfred Stevens proved himself to be, we may be sure that if he had seen his horse *in situ* he, too, would have condemned it. Were we able to look at the monument from a proper distance, it might be effective; but as close as one is compelled to stand, the horse and man appear as monstrosities. And so, as we cannot have the artist's own model, why finish the monument? Surely it is best to leave well enough alone? There is no work of modern times superior to Stevens's — it ranks with the great Italian monuments of the best period, and it were a grievous pity to mar its fine effect by adding a horse and rider by some other sculptor, as any group must infallibly have the effect of being crushed by the arch. It is sad that the monument could not have been placed at the end of the nave facing east. What a grand effect it would have had out in the open space!

A most interesting account of the temples of Philæ by Mr. Ronald Jones shows us, unhappily, the great temples half immersed, and he holds out little hope of their reappearance to Western eyes, as few Europeans would care to go to Egypt between the months of April and December. Could no scheme be devised to preserve the temples? Here is a fine opportunity for an architect and a sympathetic millionaire. Why not unpick the Temple of Isis and rebuild it upon the mainland in a safe place?

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

HOUSE OF REID NORTHRUP, ESQ., ST. LOUIS, MO. MR. W. ALBERT SWASEY, ARCHITECT, ST. LOUIS, MO.: TWO PLATES.

NO. 135 BAY STATE ROAD, BOSTON, MASS. MR. JAMES MULCAHY, ARCHITECT, BOSTON, MASS.

TRINITY MEMORIAL P. E. CHURCH, WARREN, PA. MR. F. G. W. DIETRICH, ARCHITECT, NEW YORK, N. Y.

PÆSTUM: AFTER A WATER-COLOR. BY MR. W. L. WELTON.

TWO TERRA-COTTA ROBBIAS FROM OR SAN MICHELE, FLORENCE, ITALY. DRAWN BY MR. W. L. WELTON.

Additional Illustrations in the International Edition.

THE LIBRARY: HOUSE OF MRS. A. W. ARMOUR, KANSAS CITY, MO. MESSRS. VAN BRUNT & HOWE, ARCHITECTS, KANSAS CITY, MO.

DINING-ROOM IN THE SAME HOUSE.

DETAIL OF COLONNADE OF THE LOUVRE, PARIS, FRANCE. MEASURED AND DRAWN BY MR. W. L. WELTON.

This and other subjects in this issue represent some of the work done by Mr. Welton while holding the place of a Rotch Travelling Scholar, a couple of years ago.

DETAIL OF THE GRAN GUARDIA VECCHIA, VERONA, ITALY.

A PAVILION ON THE PLACE ROYALE, RHEIMS, FRANCE.

COURTYARD DETAIL OF THE UNIVERSITY, PADUA, ITALY.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

AN EXAMINATION OF STEEL SKELETON WORK.

PROVIDENCE, R. I., Sept. 1, 1903.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — As a contribution to the discussion of the effect of cinder concrete in fireproof skeleton construction, the examination which we have been able to make of a building erected five years ago under our supervision, may be of interest.

The building is five stories high, of skeleton construction of "Z-bar" columns and steel beams, which had a coat of red lead before delivery and another coat after erection, with outside walls of brick surrounding the columns in which they are imbedded. The interior steel-columns and the lower flanges of the beams are protected with hard plaster on wire lathing. The floors are of cinder and Portland-cement concrete laid on $\frac{1}{8}$-inch expanded metal, 3" x 6" mesh, 1 inch of the concrete above the expanded metal and 3 inches below it, and the concrete is carried down to the bottom flange of the beam in the usual manner. The beams in the floor are 4 feet 6 inches on centres and were made of a depth to carry safely a live load of 250 pounds per foot.

The work was, much of it, done in the late fall and early in the winter of 1898, some of it being exposed to very cold weather and most of it to severe rain storms before the building was roofed in. After the building was roofed in and the concrete had thoroughly set, but before the building was finished, a test was made of the strength of the concrete floor-plates, which were loaded up to 900 pounds per square foot without injury and with but slight deflection.

Since the completion of the building the floors have been almost constantly loaded up to 400 pounds to a foot in nearly every part of the building.

We have been called upon to drop the first-story floor 2 feet $8\frac{1}{2}$ inches while the tenants, wholesale and retail grocers, were carrying on their business, and as the floor which was lowered was used for putting up goods for delivery and also for the delivery of the goods to the teams, the business could not be interrupted, but had to be carried on without interruption while the work was in process.

To do this work it was necessary to expose in very many places the steel frame where it was embedded in the brick wall, where it had been enclosed in the cinder concrete and where it had been protected with steel lath and patent plaster. In no case was there any indication of corrosion, the paint showed scarcely any sign of discoloration and upon scraping the paint the metal under the paint was as bright as when it left the shop. Guide numbers painted on the beams in the shop could easily be read.

The expanded metal in some places showed very slight signs of rust, but not enough to cause any apprehension, and apparently corrosion had stopped.

There seemed to be no indication of rust around the rivets, which had to be driven out, on the brackets which were removed and used again in their new location, or on the "Z-bar" columns behind the brackets.

The concrete plates which were uncovered showed no signs of fracture, and the concrete floors were so solid and firm that the work of cutting the channel to separate the floors from the side walls of the building was no easy task.

There is an elevator enclosed by a partition made of 4-inch terra-cotta blocks, laid up in lime-mortar between vertical tees, $1\frac{1}{4}$" x $1\frac{1}{4}$" x $\frac{3}{16}$", set 18 inches on centres on both sides of the partition to stiffen the same. This partition was plastered both sides with hard plaster to a thickness of about $\frac{3}{4}$ inch over the terra-cotta and $\frac{1}{4}$ inch over the tees. The tees in this partition show more signs of rust than any other of the work, but these tees were not painted and it is evident that the rust was formed before the plastering dried and has not increased since it dried out.

From a very careful examination of this building, which was built without any special care to prevent rust, except the two coats of red lead referred to, there would seem to be no warrant for the apprehension which has been expressed as to the imminent or even remote danger of the destruction and collapse of skeleton buildings with cinder-concrete and expanded-metal floors and beam-covering, and plaster column-protection. Very truly yours,

STONE, CARPENTER & WILLSON, ARCHITECTS.

NOTES & CLIPPINGS

THE BERING TUNNEL FALLACY. — Once more the chimerical scheme for building a railroad from the Pacific coast terminus of the transcontinental railroad systems to Alaska, and carrying the road beneath the Bering Strait by a tunnel to connect with an extension of the Siberian Railroad, is being agitated. The improbability of such a railroad being built, or if built, being made financially successful, can only be understood by taking a map of North America and tracing the proposed course of the line. It will then be seen at a glance how vast are the distances which this proposed road must cover. From Vancouver on the Canadian Pacific line to Bering Strait is at least 2,500 miles. The Bering Strait would involve a tunnel nearly sixty miles in length, that would have to descend several hundred feet below sea-level to find a stratum suitable for tunnel operations; then on reaching the Asiatic shore, there would be another stretch of about 2,700 miles to be surveyed and constructed before connection was made with the present Trans-Siberian system. The difficulties in locating and building such a line can only be understood by engineers who are familiar with the physical and climatic obstacles to be overcome. No mere hasty reconnoissance would be sufficient to give even an approximate estimate of the cost of the Trans-Alaskan portion of the route. As to the construction of the tunnel, the mere preliminary borings to ascertain the character of the material to be encountered would be an enormously formidable task in itself, and when this was successfully completed, there would still be a grave element of doubt as to the practicability of keeping the tunnel free from an inrush of water which, if it should occur under the pressure due to the great depth, could not fail to be disastrous. We are aware that the enthusiastic promoters set down the cost of the sixty-mile tunnel at $20,000 000; but when we consider that the twenty miles of subway tunnel in this city are to cost $35,000,000, it is pretty safe to say that the $20,000,000 would not be sufficient to cover the cost of the tunnel and the surveys, to say nothing of the 5,000 miles of connecting railroad that would be necessary. Even if the engineering difficulties could be overcome (as undoubtedly they could with sufficient time and capital), where is to be found a body of financiers to put through an undertaking which could not possibly render any return on the investment for many a decade to come, if ever it did? Moreover, even if the road were built, it is pretty safe to say that it would have to depend almost entirely upon the passenger and local traffic for its development; for it could not possibly hope to compete in the carriage of freight with the large merchant steamships that are being built for the Trans-Pacific trade. The idea of an all-rail route from Paris to New York is picturesque, sentimental and quite impractical. It is certain that in the present stage of development of northwestern America and northeastern Asia, the scheme will never get beyond the paper stage. — *Scientific American.*

THE FOUNDATION OF ST. MARK'S TOWER. — The rumors about the irremediable condition of the site of the Campanile of St. Mark, Venice, do not appear to be exaggerated. The correspondent of the *Scotsman*, who, since the collapse of the structure, has been able to obtain accurate information on all points relating to the proposed works, says it was taken for granted that the old foundations continued to be stable throughout their depth. They are visible, and he says: "The sight is not a little surprising." The lower courses are found to be of smaller and unhewn stones, not too carefully laid, and apparently thrown down in hot haste to keep out the water. They are of Istrian sandstone, liable to absorb water and to disintegrate. Common lime mixed with sea-sand was used for mortar. The result is, says the correspondent, that the salt water has percolated through and through all the foundations of the Campanile, below the level of high-water mark, which is the level of the piazza, and has disintegrated the mortar and washed it out. As the tide falls in the lagoons the water trickles all through among the foundation-stones, running in little streams in places. Again, the foundations of the Campanile have a list towards the Doge's Palace. This at the level of the pavement of the piazza is nine centimetres, or 3½ inches, which is not much, but as the tower ascends, it would amount to a great deal. Once more, hydraulic lime will not attach itself to ordinary mortar. There would be difficulty in uniting the old with the new. Lastly, the foundations are split from top to bottom where the door of the Campanile was. The architects, engineers and builders are said to consider it would be madness to build on foundations which have served for a thousand years. The correspondent concludes by saying: Now is the time to agitate for the rebuilding of an artistic Campanile on another site, and leave the Piazza of St. Mark, the drawing-room of Venice, free in all its amplitude of beauty as it is to-day. — *The Architect.*

COSTLY SAWS IN SLATE QUARRIES. — Probably the most expensive saws in use anywhere in the world are those in the factories of Pennsylvania where various articles are manufactured of slate. In one of these factories there are 300 horizontal saws, 12 feet in length, each of which is furnished with seventy-five cutting diamonds, each saw being worth $5,000. The slate land which furnishes the materials for these costly saws to work upon was once so little valued that the tract upon which the famous Chapman quarry in Pennsylvania is situated was sold for a pint of whiskey. Its subsequent owners have taken millions of dollars from the land. The most valuable slate deposits in the world are found in the central and eastern parts of Pennsylvania. In the neighborhood of the Pennsylvania quarries there are houses whose walls are entirely of slate. The blocks of which they are made are smoothly sawed, and are certainly most substantial. When slate is blasted in the quarries the rough slabs are taken to the shanties of the "splitters." The stone forms naturally in layers, and the "splitter," following the grain or "ribbon" with his large chisel, separates the blocks into strips. Then these strips are passed through a trimming machine, where by the blows of a heavy knife they are cut into rectangular "shingles." Then they are piled up into "squares," ready to be used for roofing purposes. When slate is cut up for use in other ways the procedure differs. The huge horizontal saw, with its scores of diamonds in the factory, is called into play; it is lowered upon one of the blocks of slate by a ratchet at the rate of a quarter of an inch a minute. The saw would cut through iron or steel at the same rate. The workmen play a stream of water upon the slate to keep it cool, and wash the dust from the cut. After the sawing the block is planed by being moved back and forth by machinery under a firmly fixed chisel. It is afterwards polished, much as marble and granite are. — *Philadelphia Ledger.*

UNSEALED WRITTEN CONTRACTS. — In an action on a mechanic's lien, brought by the Eagle Iron Works against Thomas M. Farley, it appeared that the contract between the parties was in the form of a written offer by the plaintiff to furnish and set certain ironwork on buildings in the course of construction by the defendant for $3,532. The acceptance of the offer was also in writing. But neither in the offer nor in the acceptance was anything said in reference to the time or manner of payment. The ironworks gave testimony to the effect that after the acceptance, and before it had begun to furnish the iron, an oral agreement was entered into whereby Mr. Farley undertook to pay for the work in installments. As he had failed to pay these installments, the trial Justice refused to allow the plaintiff to proceed with the work, and rendered judgment for the services and work up to that time. The Second Appellate Division, on appeal, declares untenable the position taken by Mr. Farley's counsel, that because the written contract was an entire one, the admission of evidence of an alleged parol agreement to modify that contract by providing for installment payments was erroneous. "A written contract, not under seal," said Justice Willard Bartlett, for the court, "may be modified before breach by the subsequent oral agreement of the parties. 'Undoubtedly the existence of a separate oral agreement as to any matter on which a written contract is silent, and which is not inconsistent with its terms, may be proved by parol, if under the circumstances of the particular case it may properly be inferred that the parties did not intend the written paper to be a complete and final statement of the whole of the transaction between them.'" — *N. Y. Times.*

A TIME-KEEPING FLOWER CLOCK. — The greatest clock in the world, the dial of which will be 120 feet in diameter, is being built for use at the Louisiana Purchase Exposition next year. Only the hands and machinery are being made, for the dial is to be a brilliant bed of flowers. The clock will be placed on the side of the hill north of the Agriculture Building. The minute hand will be 60 feet long and the ring at the end, which will be fastened to the machinery, will be 8 feet in diameter. The numerals marking the various hours will be 15 feet in length and made of bright-colored coleus. In a broad circle surrounding the dial will be twelve flowerbeds, each 2 feet wide and 15 feet long. At night the timepiece will be illuminated with 2,000 incandescent lights. — *Exchange.*

WOMEN AS STREET-CLEANERS. — Mrs. Paul, the woman superintendent of a Chicago ward-cleaning brigade, was recently interviewed by three Italian women who were desirous of joining the force. One of them had worked eight years in her native country at street-cleaning and two years in stone quarries. Another had hauled a milk wagon in company with a dog for one year, had worked in the vineyards near Milan and had laid paving-stones in the streets. The third had carried bricks in Naples, had pushed a wheelbarrow at the excavations of Pompeii and had worked two years in Naples as a freight handler. Mrs. Paul was in favor of employing the women, but the city superintendent of street-cleaning thought not. He was of the opinion that women — even Italian women, with a past of freight handling and milk hauling — had better stick to housework. — *N. Y. Tribune.*

PERCENTAGE OF WORKING-WOMEN. — Consul-General Richard Guenther has just reported to the Department of State from Frankfort some interesting statistics with reference to the occupations of the population of the leading nations of the world, extracted from the latest official German statistics. In the percentage of women employed the United States stands lowest with only 14.3 per cent, the Netherlands and Sweden coming next. In Germany the percentage of females employed to the total self-supporting population is 25, while in England it runs up to 27. In most of the other civilized countries the female population, on account of unfavorable economic conditions, has to contribute in a larger degree to the support of the families. In Italy the percentage is 40 and in Austria 47. — *Exchange.*

THE ORIGIN OF THE HANSOM. — The hansom, about whose safety hard words are now being said in London, was the invention of Joseph Hansom, the architect of the Birmingham Town-hall, and also the founder of our contemporary, *The Builder*. But the two-wheeled cab which he patented in 1834 little resembles the vehicle which now bears his name. It had a square sedan-chair shaped body hung between two wheels nearly 8 feet high. The driver's seat was in front, as also was the door; the fare entered the cab between the wheel and shaft. The modern hansom was adapted from this original by Messrs. Gillet and Chapman. It is a peculiarly English vehicle, and no foreign nation has ever compassed the dogged courage of the Briton who can sit calmly inside it. — *London Chronicle.*

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No. 44. *No. 44.*

"Topical Architecture"

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"Domical Buildings"–IX.

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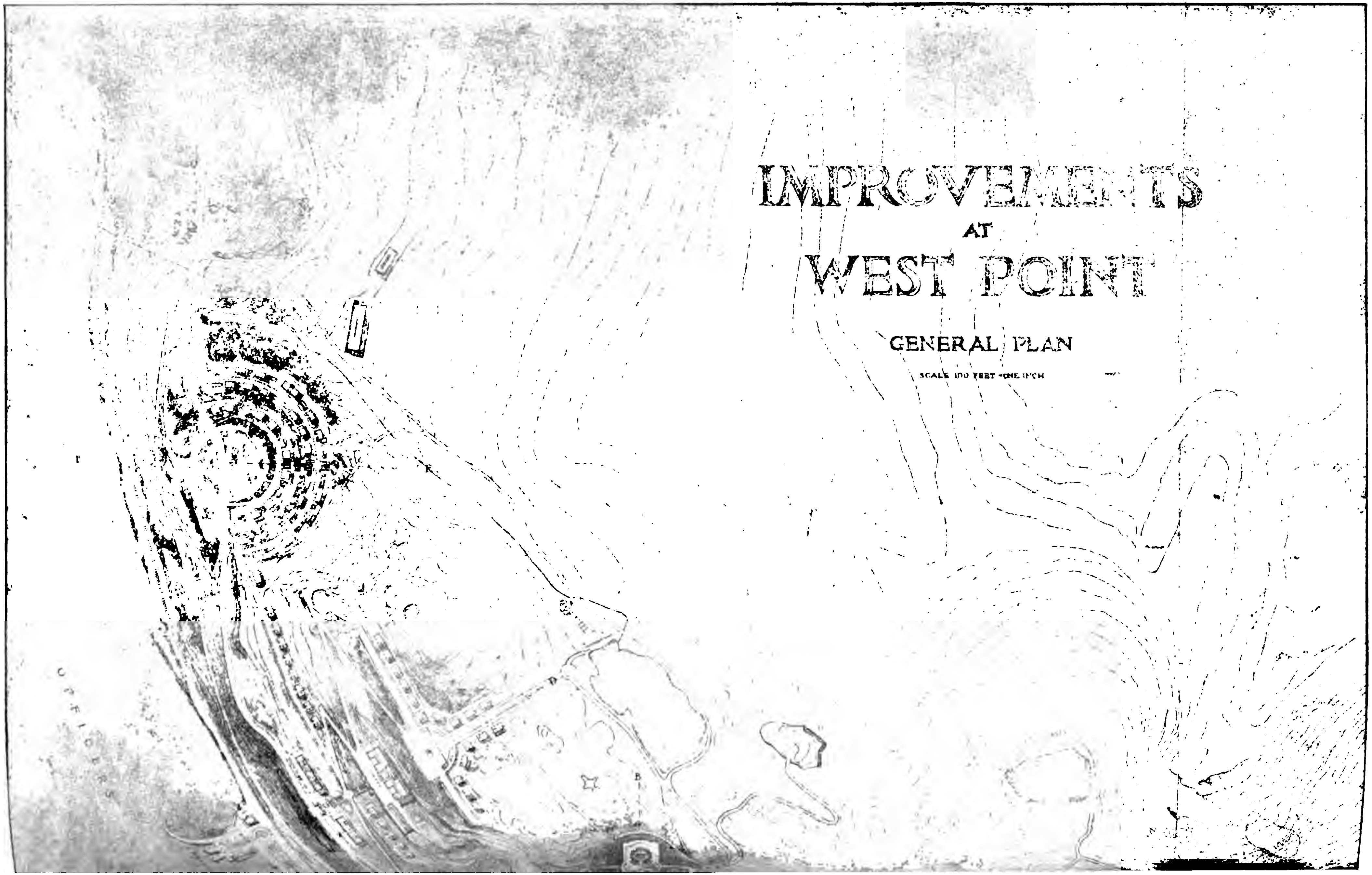
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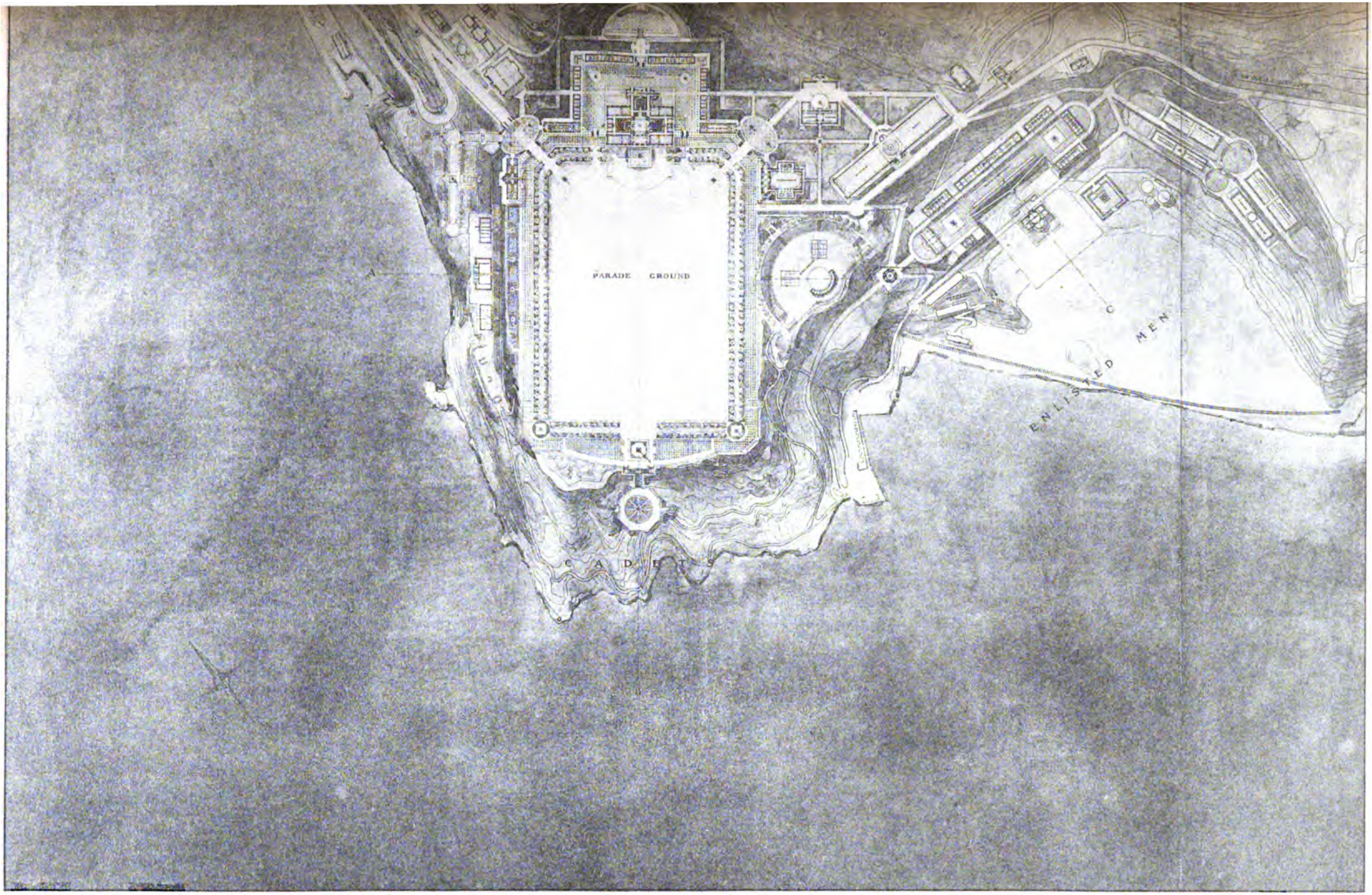

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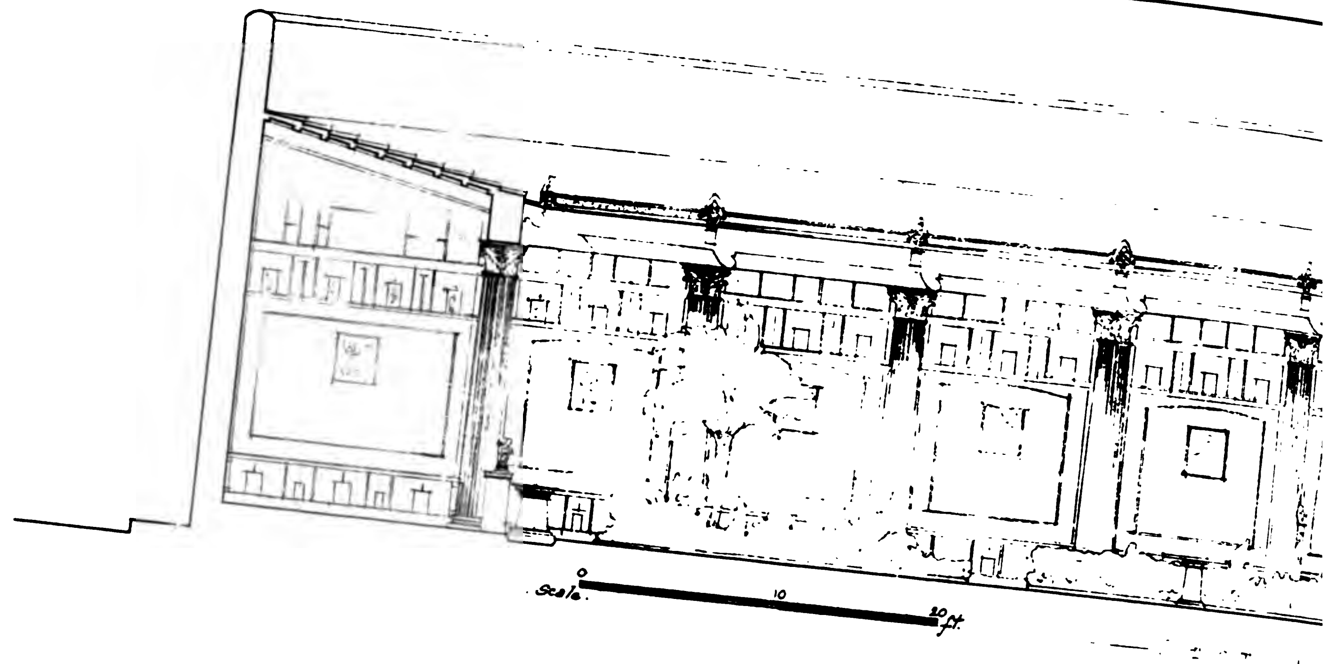
The American Architect
Sept. 19, 1903.
No. 1447.



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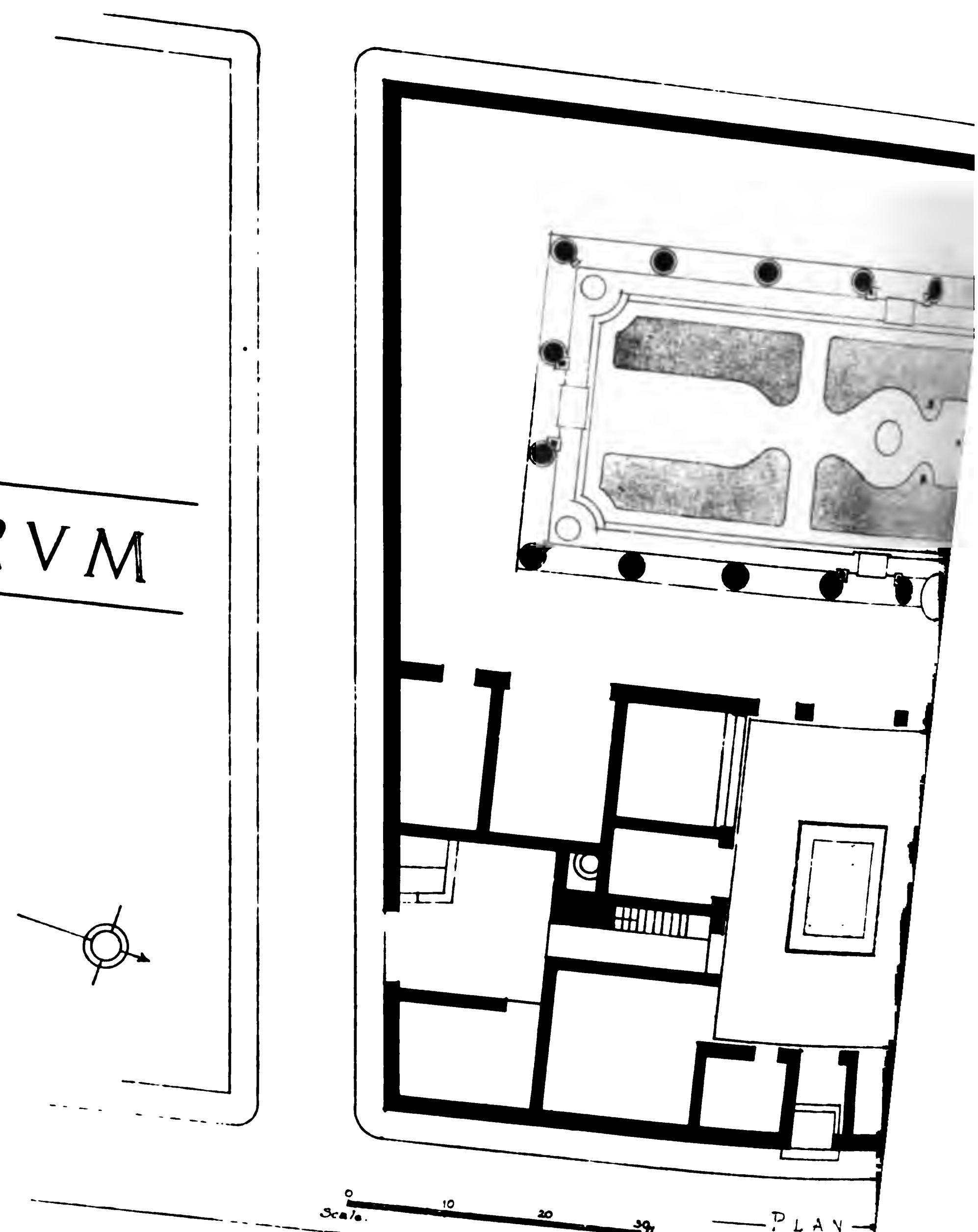

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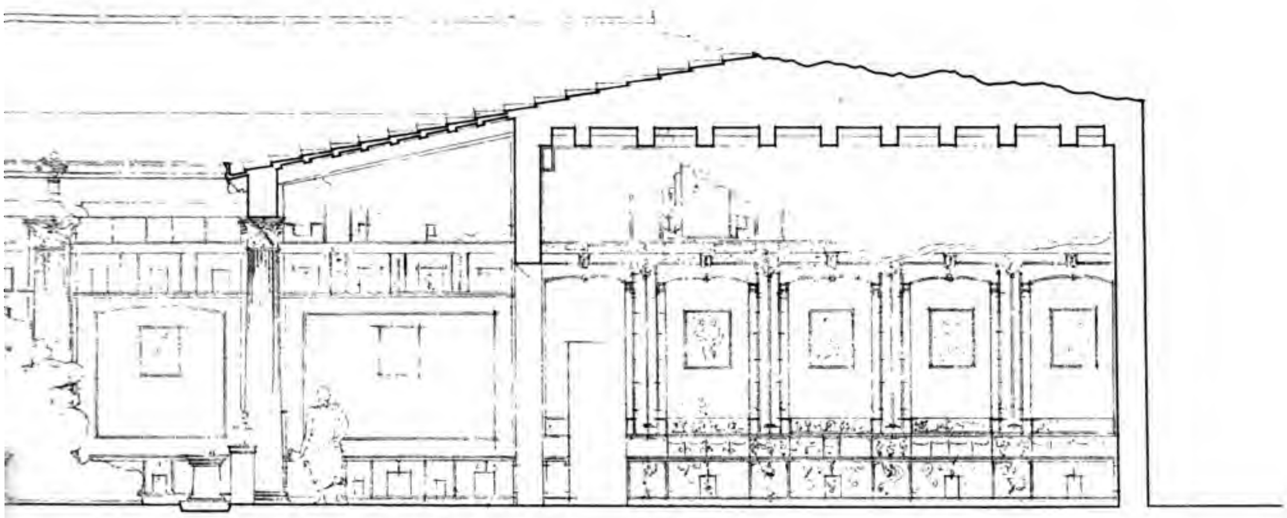

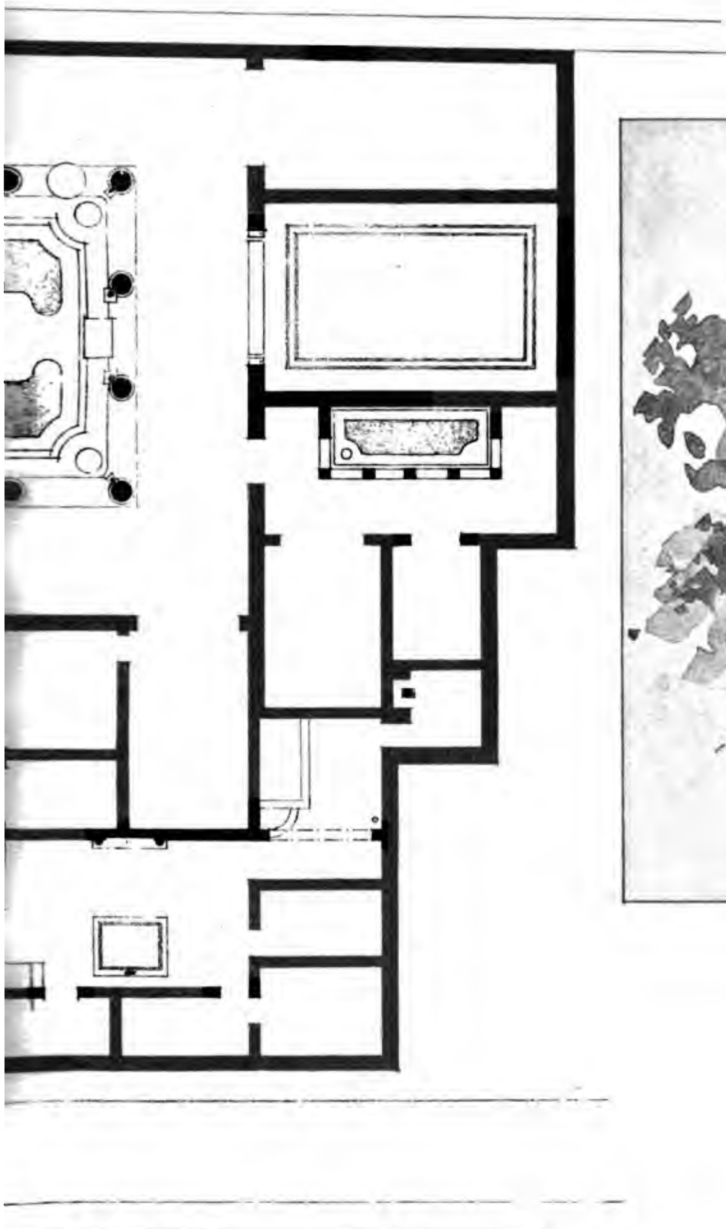

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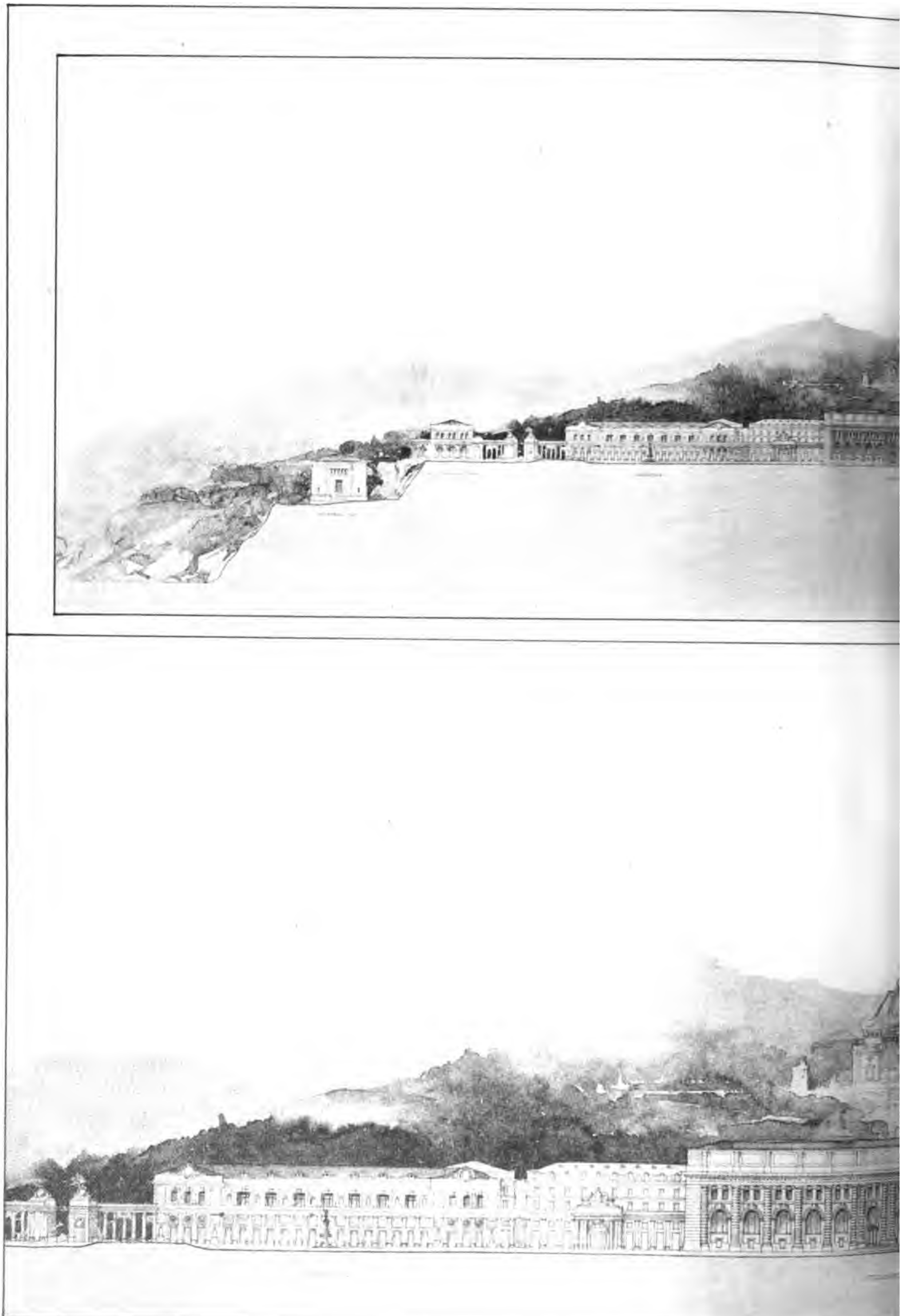

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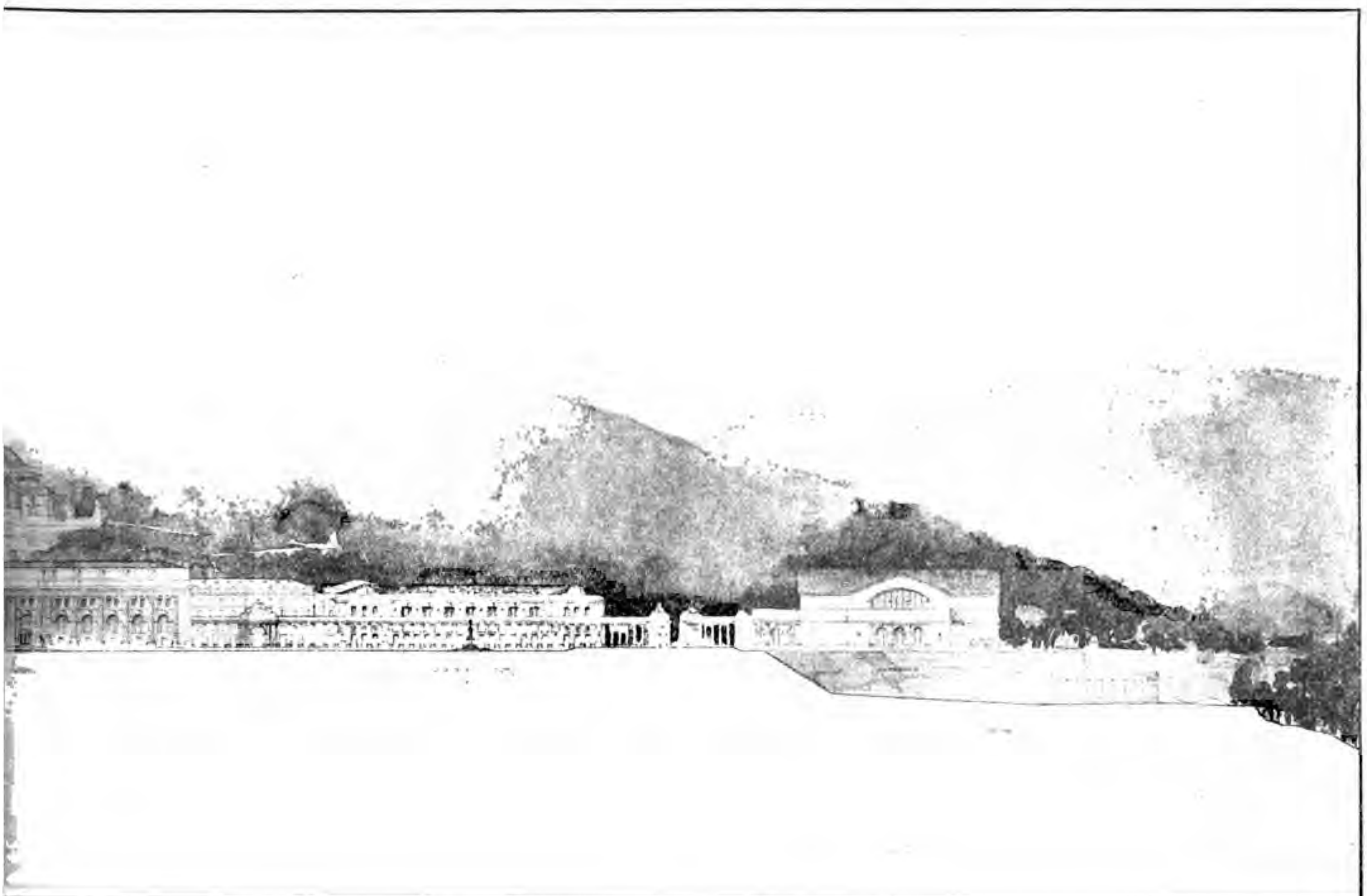

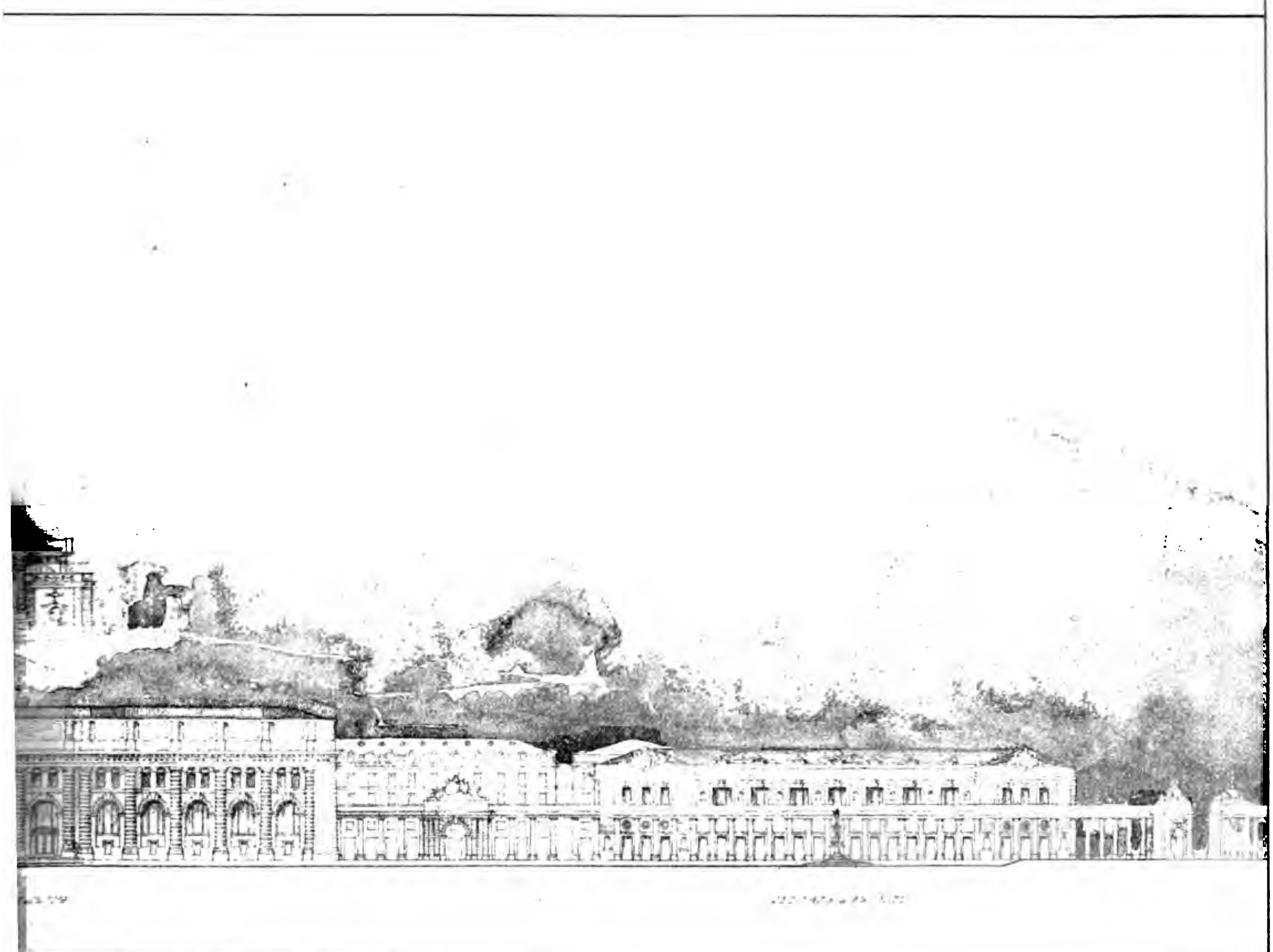

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ARCHITECTS.

The American Architect
Sept. 19, 1903.
No. 1447.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI SATURDAY, SEPTEMBER 19, 1903 No. 1447

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THE Boston *Post* has been publishing some very misleading statistics, probably gathered from union officials, about the effect of unionism in raising wages. It says that "Just a century ago the blacksmiths, the carpenters and the coopers of Boston were working for hardly one-third of the wages that they are getting to-day"; and it adds that "If John Brown, a carpenter of to-day, had been laying floors and sheathing walls on September 7, 1803, he would have been well satisfied on Saturday night to draw five dollars and forty cents for his hard week's work"; continuing with corresponding assertions in regard to the wages of blacksmiths and coopers. We will let the blacksmiths and coopers take care of themselves; but, in regard to carpenters, we may be allowed to put the evidence of some old family accounts in our possession against the statements of the *Post*, the authority for which it does not give. According to these accounts, which date from about the period mentioned by the *Post*, our ancestors paid their carpenters, in a town within sight of Boston, two dollars a day, apparently as the regular rate, this item appearing many times in the accounts. It is quite likely that the carpenters of a century ago worked harder than their union brethren do now, but it does not appear that they were any worse off on that account; and, considering the enormous increase in the cost of living within the past century, brought about to a considerable extent by labor unions and other monopolistic combinations, they were far more prosperous than they are now. According to the most recent report of the Massachusetts Bureau of Statistics, the average weekly wages of a carpenter is $15.23. This means, presumably, when he is employed, but the acknowledged tendency of union monopoly of the right to labor is to check building, and diminish the employment of building workmen; so that the average yearly income of carpenters in the large cities is given, in some recent statistics, at less than ten dollars a week. It does not need superhuman intelligence to see that the carpenter of a hundred years ago, who did not have to buy from orators or saloon-keepers a card entitling him to work for a living, and who, if he was skilful and sober, could be practically sure of steady employment, without having to pay the enormous union dues, and without being exposed to the probability of being "called out" at any time, and compelled to abandon his work for an indefinite period at the command of a political heeler of doubtful honesty, was far better off, with his regular twelve dollars a week, including a chance to rise if he exerted himself, than the union carpenter of to-day is with fifteen or sixteen dollars a week, when he is employed, but with, on an average, about three times as much to pay out for rent, flour, meat, eggs, butter and milk, shoes and clothing for himself and his family as he would have had to pay a hundred years ago.

INCIDENTALLY, the interviews with labor magnates reported in the *Post's* article shed a curious light on some of the aspects of trade unionism, even if they are not altogether consistent with each other. According to the business agent of the painter's union, the struggles of that trade against capital began in 1886, when the painters of Boston were working for two dollars and a half a day, the day being ten hours. They then joined in a general strike. The struggle lasted, according to this authority, for ten years, until 1895, when the painters "received the grant of an eight-hour working day, at two dollars and a half a day." In other words, the Boston painters wasted an enormous amount of time and money in strikes, only to find themselves, at the end of ten years, earning exactly the same wages that they were earning before they began their "struggles." In the meantime, the cost of living had greatly increased, the building business of Boston, through union exactions and interferences, had been brought almost to a standstill, and the painters, in addition to the falling-off of employment, had been saddled with the heavy union dues, and subjected to the arbitrary dictates of the union magnates. It is singular to see any one boasting of this sort of industrial "progress"; but the business agent of the Boston Building Trades Council gives figures even less encouraging. According to him, the union rate of wages for painters, instead of being two dollars and a half a day, is now only two dollars a day; so that the ten years' "struggle" of the painters has left them, by his figures, with wages only four-fifths as large as those that they were earning in 1886, with building business almost prostrate, and incomes rendered doubly precarious by exposure to "labor" manœuvres, and with all expenses of living immensely increased.

THE business agent of the Painters' Union also describes an occurrence which might well serve as food for reflection for union mechanics. In 1902 a certain union of painters had fixed the scale of wages at two dollars and seventy-five cents a day; and, as usually happens, the non-union painters doing the same work received the same wages. The union, or presumably, the managers of the union, "seeing that the non-union painter was receiving the benefits of the union in the form of shorter hours and more pay, and doing nothing to maintain these conditions, as he had done nothing to establish them, decided that if the non-union man's wages were reduced it would have the tendency of driving him into the union." With this laudable view the union voluntarily reduced its own wages, we are informed, from two dollars and seventy-five cents to two dollars and a half a day, "for the purpose of organizing the craft more thoroughly." The figures given as to the financial results of this exploit vary so widely from those furnished from the other authority that it is difficult to draw any conclusion from them; but the idea of docking all the members of a union of a slice of their pay for the sake of getting in new members to compete with the old ones is likely to appeal more strongly to the salaried officials of the union than to the working members.

MR. WALTER DICKSON, one of the best-known architects in New York State, died in Brooklyn a few days ago, at the age of sixty-eight. Mr. Dickson was for many years established in Albany, where he executed many important commissions, and gained the highest esteem of the profession and the public. He was the architect of the Albany Post-office, and of the Albany City Prison, among other public buildings. He removed to Brooklyn some fifteen years ago, and formed a partnership with Mr. Withers. The firm of Withers & Dickson carried out much important work, and gained a certain public prominence through its courageous struggle against Tammany methods in the matter of the Tombs prison, which it designed, and should have carried to completion.

THE profession will be interested in the explanation of the removal of Mr. Henry Ives Cobb from his position as architect of the Federal Building in Chicago, and may, perhaps, draw from it a moral as to the standard of professional service that the Government insists upon. Briefly the dissatisfaction of the Government officials seems to have been based upon nothing more serious than the unbusiness-like way in which the building had been carried on. Architects cannot be too often reminded that, in public work, precision and clearness in making contracts, and checking the accounts connected with them, are absolutely essential; and Mr. Cobb, who is a very

busy man, seems to have forgotten this. The contracts for the Chicago building, we are told, are hopelessly confused, and a conference between the Supervising Architect of the Treasury, the new special superintendent of the building, Mr. Von Nerta, and the contractor, will be necessary to put them in proper shape for completing the structure. Meanwhile, it ought to be noted that any oversight or negligence of any private architect employed on Government work seriously affects the whole profession. After years of struggle, the profession has been admitted in this country to public employment, on the ground that private architects were capable of carrying out public work with at least as much efficiency, economy and skill as official architects. All our readers know that this claim is a just one, but it has been difficult to get public officials to admit it at all, and every exhibition of incapacity strengthens the opponents of the present system and makes more precarious the feeble hold which the profession has already gained on public employment.

GENERAL BOOTH TUCKER, of the Salvation Army, writes for the September *Bulletin* of the Bureau of Labor an extremely interesting article on the Farm Colonies of the Salvation Army. These colonies, with the practical common-sense characteristic of the Salvation Army, were established "for the purpose of enabling stranded but worthy families to keep together, and ultimately, by their own exertions and payments, to become home-owners," and the same practical common-sense seems to have made the experiment uniformly successful. In this country only three colonies have been founded, the oldest of which has not completed its fifth year, so that it is too soon to speak with certainty of results, but the principles on which they are conducted give promise of good results. Nothing like community of ownership of land, goods or anything else is proposed, or even tolerated. The Salvation Army believes that communistic schemes usually result in "the lazy doing nothing and expecting everything, while the industrious do everything and get nothing — at least nothing commensurate with their toil," and the end of the affair is that the industrious go where they can get adequate pay, and the lazy ones, left to themselves, quickly scatter. Another mistake which the Salvation Army avoids is that of preferring to colonize the unmarried poor. To say nothing of the importance of encouraging the family life which is the foundation of the Republic, it is shown that, in the long run, it is cheaper to colonize families than single men, for the reason that a married man commands a large amount of unpaid, zealous and intelligent labor. As an illustration, the Report describes a family, which was brought from the city, and settled in one of the colonies. Soon afterwards a visitor found the father cultivating his land, to advantage, while the children were earning two dollars a day apiece, picking berries for a neighbor, and the wife looked after the house, the baby, the meals and the poultry; all of them happy, contented, self-supporting, and on the road to prosperity. In another case a workingman from the city, with his wife and three children, arrived at the Fort Amity colony with a team and some furniture, comprising all the property which he had been able to save in ten or twelve years of married life. He was advanced nine hundred dollars for his railroad fares, land, seed, tools and stock. In three years he had paid off the entire debt, and owned twenty acres of unincumbered land, and a stone cottage, built with his own hands, besides supporting himself and his family during the interval. Moreover, the value of land, in consequence of the improvements, and the creation of a market by settlement, rapidly rises, so that in some cases improved farms sell, at the end of three or four years, for five times their cost; so that the poor, discouraged workingman of three years ago not only has a living assured him, but can take comfort in the knowledge that his family is provided for.

THE system pursued is to select worthy families of the city poor, pay their travelling expenses, if they have no savings of their own, charging them with the cost, and furnish them, on arrival at the colony, with a suitable quantity of land, a cottage, live stock and implements, under a contract for repayment. The settlers take much pride in the sense of ownership, and are eager to pay off their debt at the earliest possible moment; and statements of the amount due are furnished them at regular intervals, not only to keep them up to their obligations, but to encourage them by showing the diminution of the burden as payments are made. General Booth-Tucker says, with truth, that, considered merely as an investment, hardly anything could be safer than these loans to colonists, for the reason that the settlement itself increases the value of land sufficiently to cover any probable loss of money lent for improvements, with interest and taxes, even if the borrower should fail to pay anything.

IN curious contrast with this beneficent scheme for taking from the great cities the despairing dwellers in the rookeries of the slums, and settling them in their own modest homes in the country is the demand which is said to have been made by the "labor champions" upon the Democratic politicians that, as the price of their support, it shall be made a part of the Democratic policy to prohibit all immigration into this country for fifteen years, the reason given being that there is only work enough here now to keep the present inhabitants employed, and that they must be protected from the competition of new arrivals. Considering the enormous benefits that this country has received from immigration, and the vast territory which still remains to be occupied by useful citizens, producing for the benefit of others, and consuming what others produce, this demand sounds like an echo from the Dark Ages, but it is seriously made, and it would hardly be surprising to see it added to the other miscellaneous ingredients of modern Democratic doctrine. Whether it will make the latter any easier for voters to swallow than it is already remains to be seen, but the merchants and manufacturers who want more customers for what they sell or manufacture, the operatives who help to make the goods to sell to the newcomers, the carpenters, bricklayers, plasterers and painters who would like to be employed in building new houses to accommodate the strangers, the tailors who will supply them with clothes, and the hatters who will furnish them with hats, are likely to be a unit in resistance to the movement.

COUNTRY LIFE IN AMERICA is having what the Sunday newspapers call a "symposium" in regard to fencing in private grounds. Mr. J. Horace McFarland, the President of the American League for Civic Improvement, denounces fences on street lines as "an insult to one's neighbors and the community," and thinks that a fence implies that the person who erects it is himself disposed to trespass on his neighbors' gardens, and therefore attributes to them the inclination which he is conscious of in himself; while Mr. Julian Tinkham thinks that this idea, although widely prevalent in this country, is a mistake, and that the privacy implied by a fence or hedge adds to the charm of a house, instead of detracting from it. If we are not mistaken, the late Mr. Olmsted held the same opinion, considering it desirable, in most cases, that houses on suburban streets should be separated from the public highway by hedges or light fences, while he approved the omission of fences between adjoining properties, as suggesting a pleasant neighborly confidence, as well as affording better and broader landscape effects.

IT may be observed that a fence does not, by any means, imply the churlish brick wall, eight feet high, with broken glass on the top, so beloved of our English cousins. The Italian garden walls, which Mr. McFarland joins with the English ones in his condemnation, are so commonly draped with passion-flowers or purple clematis, or ivy geranium, expressly to give pleasure to the passer-by, that they have a very different effect from the English fences; and the street fences in the newer part of Paris, of light ornamental iron-work, covered with ivy or myrtle, and protecting the tiny gardens or the flowering shrubs behind them, are, to our mind, quite as attractive as the dislocated curbings reminiscent of dogs, and inclosing more or less mangy grass-plots, which line so many miles of streets in the fashionable quarter of Boston. It is true that a fence, even a low and open one, conveys the idea that the proprietor of the house behind it would rather have people come through the gate than wander at random over his flower-beds, but we are not so sure as Mr. McFarland is that this is an objectionable state of mind. Shakespeare has something to say about people who wear their heart upon their sleeve for daws to peck at, and, as a little reticence is not only compatible with perfect courtesy and perfect sincerity, but adds a charm to those virtues, so a pretty fence or hedge on the street line, not high enough to hide anything behind it, but affording a modest barrier against too great familiarity, is, to our mind, decidedly advantageous to the artistic effect of a house, as well as to that of the street on which such houses stand.

JAMES McNEILL WHISTLER: A RETROSPECT AND AN APPRECIATION.

THE "Butterfly" has fluttered away to other climes. The position which this painter will occupy in the history of the world's artists a hundred years hence is difficult, impossible, one may say, to determine, as it depends upon the artistic qualities of our successors. But the position of Whistler among his contemporaries, artistic and Philistine, has probably been due to his choice of epigram as his guiding principle. Had he desired a motto upon which to build up his reputation, he might have chosen Danton's famous words: "*De l'audace, de l'audace, et toujours de l'audace.*"

For many years we were asked to gaze on "nocturnes," and "symphonies" and "studies in blue and brown," or "pink and grey"; and our verdict was given according to our temperament, our sympathy and our artistic knowledge. Was it impudence "to ask 200*gs.* for two days' work"? or was it a fair and just price for the "knowledge of a life-time"?

It is curious here to observe that when the famous trial of Whistler *vs.* Ruskin took place, neither the attorney-general nor the public had any idea that an artist should be paid for experienced and hard work. The physician gave his patient a few words' advice and received his 2*gs.* in payment. The barrister might claim his 200*gs.* or 2,000*gs.* for a certain amount of time and trouble in getting up his case and arguing it. This was all brain work. But the artist's long plodding years before he could make a shilling, his life of thought and study were of no value — he just sat down before his model or his "view," and painted. How can you compare the work of a "professional man" with that of a "mere painter"? said society. But times have changed; the harmonious "nocturnes in blue and gold, and blue and silver," otherwise beautiful sketches of the effects of gas and moonlight; the pictures of murky Thames reaches and bridges, the London fog, yellow and grimy, the "little white girls," and all or most of the symphonies, have become more or less popular, although the Trustees of the Chantry Bequest still prefer such amazing pictures as the "Two Crowns" and their like. Doubtless when a Whistler goes at Christie's for 2,000*gs.*, good old Chantry's money may then be invested in it.

It does not seem long since we were all amused by the exhibition in Bond St. (1892) and its smart catalogue, an echo of its forerunners put together through the agencies of paste and scissors, and covered with the familiar brown paper. Its title "Nocturnes, Marines and Chevalet pieces," and its contents, cuttings from newspaper, criticisms of the pictures when first they appeared years before, were both first-class specimens of Whistlerana. It was a document to keep. On the fly-leaf is written "The voice of a people"; at the end, "*Moral.* Modern *British* (!) art will now be represented in the National Gallery of the Luxembourg by one of the finest paintings due to the brush of an *English artist* (!) namely, Mr. Whistler's portrait of his mother. *Illustrated London News.*" The italics are, of course, the artist's, who was thoroughly acquainted with his public. For years he had been working along a somewhat monotonous path, repeating himself as does the low comedian in a popular farce, reiterating his words in the same tone and with the same emphasis — as "my goods and chat-tels," or "no fellow can understand that"; and then at last, those who had come to laugh, stayed to admire, and the critics were made to eat their own words. Who would venture to endorse the remarks of the attorney-general now? "I do not know when so much amusement has been afforded to the British public, as by Mr. Whistler's pictures."

So the world wags; great artists live and die, and posterity reaps the harvest. But few have had the opportunity or the desire to slash the slashers. Whistler was independent enough to seize his opportunity, and he always relished the work. Nor can we pity the critics. Take a few specimens: "A Farce in Moonshine, with half-a-dozen dots." Mr. Jones, R. A., thought 200*gs.* a large price for a nocturne "when you think of the amount of earnest work done for a smaller sum" — yet what do we now consider the value of a nocturne, and where is Mr. Jones's "earnest work"? The painter of the Derby-day considered Whistler's paintings as "not serious work." Ruskin considered that we could "paint a cat and a fiddle, but we cannot imitate the ocean or the Alps" — yet no one tried more than the famous art-critic, so to do. Did he too build up "art out of his own imperfections," as the *Times* said of Whistler? Most of the criticisms would now be reversed — have been quite recently in many of the same journals in which the painter was tabooed years ago; showing that the little keen-eyed "Butterfly" was wiser than his generation. He, like the importunate widow, persisted in his ways for good or for evil, and now the public acknowledges the error of its ways. Possibly also it was the artist's manner; his failure to see a joke when it was pointed at him instead of issuing from him, and his persistence in the "gentle art of making enemies"; all this made the enemy to blaspheme.

But if we forget eccentricities, affectations, clap-trap, and epigrams, what a mass of good points remain in the work itself. No one but the over-prejudiced can do aught but admire the portraits, the delightful "little girls in white," the fine etchings, and the snowy Chelseas. It is true they are all executed in a minor key, these "symphonies" and nocturnes — so are those of Tschaikowsky and Chopin; but should a painter or a musician be run down because he sees mainly the sad side of nature? "*Il ne faut jamais faire agir un homme dans un sens different de son caractére,*" said Madame G. Sand de Stael.

Whistler's work was often ugly — reaction from the prettinesses of the Books-of-Beauty ladies of a former generation; but how many painters of our time can manage half-a-dozen different blacks and browns? — velvet, silk, felt and feathers. Are not the sea-green trimmings and bows of little Miss Alexander's white frock, as refined in tone as anything Velasquez has given us? And are not the greys and pinks in the portrait of Lady Meux suggestive of the tones of some of the great Spaniard's work? Naturally it is not suggested that the American will rank with the Spaniard in future years; but posterity may place him on a lower rung of the same ladder.

Again, are not Whistler's landscapes among the finest class of Nature study? His moonlights are superior to Turner's, though inferior possibly to Cazin's. The American's "Blue wave at Biarritz," reminds one of Courbet's "Wave" in the Luxembourg — but it is wetter, though not so limpid nor so poetic as Mr. Harrison's many pictures of the sea under conditions of calm and storm. No one has painted the Thames and its fogs as Whistler has portrayed it; no one but he has seen it as born Londoners know and love it, with its marvellous possibilities to the artist. Turner learned much from it; but Chelsea in his day was not a part of London. "The Poetry of Fog" might be the title of many of Whistler's studies of barges and coal lighters.

Mr. Whistler invented his signature of the "Butterfly" himself — it was his *nom de guerre* or *nom de pinceau;* but it is not the least probable that his reputation will resemble the life of the brilliant insect which flickers about in the sunshine, and then fades away into the unknown.

The artist's greatest enemies were his indiscreet friends and his own caustic tongue. Two of them are now discussing in the London papers the snubbing he experienced by official Englishmen; he being, in their opinion, the "greatest painter of the nineteenth century." Were then Constable, Corot, Millais, Daubigny, Turner, Millet and many another mere pigmy painters of the last century? And, then, as to the want of appreciation which he received! The last person am I to take up a brief for the Royal Academy; but we must be just before all things, and the fact remains that Whistler's early works were hung, and later ones might have been also, for one, at least, of the R. A.'s even purchased a picture — "At the Piano." This was John Philip. In the sixties, he was appreciated by many Londoners, notably Mr. Leyland, whose famous peacock room we all remember. In France his first official recognition was in 1889. His own countrymen rejected his etchings, and so he appealed to the English commissioners at the 1889 Paris Exhibition, and he was hung in the British Art Section. He objected to the decision of a "competent and impartial jury of his peers," and judged one of their number as a man who had "never before come upon an 'etching' in his hitherto happy and unchequered Western career," but he found the hanging of his works by the British section (made up largely by Royal Academicians) as "perfect," and he received as a British artist a first-class medal. Are then Mr. Heinemann and Mr. Pennell justified in their protest against a collected exhibition of Whistler's work at Burlington House, supposing it to have been thought of? S. BEALE.

IMPERVIOUS CONCRETE.[1]

B. R. GREEN, M. Am. Soc. C. E.: The question appears to be simple. Of course, it stands to reason that any concrete to be water-tight must be so nearly solid — the interstices of the component materials or aggregates so well filled — that there shall exist in the mass no interstices or connected porosity, through which water can find its way from one side to the other. Most stones are permeable to water. It will soak into them. This is indicated by the tendency of some cements to stain stones that are embedded in or backed up with them, and by the earth stains found at greater or less depth in exposed rocks in nature. Building sand consists of very small stones. Even pure cement, after becoming indurated or set, will also soak water somewhat, especially if not ground to extreme fineness.

If, therefore, the materials of which concrete is composed are permeable to water, the concrete itself must be so, even if so well made as to be free from porosity or spaces between the stones, particles of sand and cement. But, while water will soak through these materials, it is known that its progress is very slow, so slow that under slight heads of water thick and carefully built concrete walls will keep quite dry on the outside if exposed to drying air, the water evaporating as fast as it reaches the surface. This seems to be the whole story.

It would be very easy to determine by experiment the coefficient of soakage of pure cement for different thicknesses of wall and different heads of water, and the same for cement-mortar with good quartz sand.

The speaker firmly believes that cement-concrete can be made as water-tight as a stone wall, but not absolutely moisture-proof, without the application or insertion of a coating or core of some perfectly impervious material, like asphalt.

J. W. SCHAUB, M. Am. Soc. C. E.: In building an ordinary concrete cistern to hold water, all that is necessary to make the concrete impervious is to wash the walls inside with grout. Usually two coats of neat cement grout are sufficient for this purpose. This

[1] Extracts from an informal discussion at the Annual Convention June 11, 1903, before the American Society of Civil Engineers and printed in the *Journal* of that Society.

coating on the inside will hold the water in the cistern, but it is not impervious to water from the outside. In order to make a cistern impervious to water, inside and outside, it would be necessary to wash both sides, if possible, with grout. This is exactly what should be expected: the fine particles of cement closing up the pores of the concrete, similar to the caulking of the seams of a water-tank or boiler. In order to make a tank hold water it is necessary to caulk the seams from the inside; and, in order to make it impervious to water from the outside it is necessary to caulk the seams from the outside. The above applies to concrete when the water-pressure does not exceed a head of, say, 10 feet. For pressures greater than that, the wash of grout does not suffice, and, in addition, the speaker has used asphalt, applied hot, with a mop, until a coat, ½ inch thick, covers the grout, and the results have been entirely satisfactory. To what extent this can be carried, the speaker is not prepared to say, but he believes that a coating of asphalt ½ inch thick, in addition to the grout, is sufficient for a water-pressure of 60 feet, and he has recently specified this coating for this pressure.

When the face of the wall to be waterproofed is accessible, it is a simple matter to apply the washes of grout and hot asphalt. If, however, the face is not accessible, the speaker knows of no method to be used to make that face impervious to water, excepting to build the wall in two parts, and fill the core or hollow space between the walls with asphalt. This method was used successfully in St. Louis, several years ago, in stopping leaks in a conduit, after every other method had failed. To be sure, a coating of asphalt is not permanent, but nothing is permanent in this world, and a coating of this kind, where exposed to the direct action of water, will have to be renewed about every ten years, the water acting on the asphalt as a solvent, as it does on everything else. Where the asphalt is used to fill up the cores in a wall, it will probably last as long as the wall.

In case the concrete is reinforced with steel, it becomes almost necessary to make the concrete impervious to water, for it has been shown,[1] by M. Breuillé, a French engineer, that a chemical union takes place between the metal and the cement, forming the silicate of iron, which is soluble in water. When this salt has been dissolved, the bond between the metal and the concrete is destroyed, and therefore the combination of the concrete and steel is no longer steel-concrete, but a conglomerate of two substances which have nothing in common, excepting, perhaps, their coefficient of linear expansion. M. Breuillé has also shown that, where concrete has been protected by means of an asphalt covering, this union or bond between the concrete and the steel has not been destroyed by the action of the water. The conclusion to be drawn is, that the concrete should have a coat of asphalt, or some other form of waterproofing, in order to make it impervious to water.

The speaker would suggest that this question, together with the entire matter of steel-concrete, be referred to a Special Committee of this Society.

Oscar Lowinson, Assoc. M. Am. Soc. C. E.: About four years ago the speaker had an experience, recalled by the remarks of Mr. Green, in reference to the means by which concrete can be made water-tight. He tried to build a cellar on South Street, in New York City, which was to be made impervious to water against a head of about 6 feet. The building is located about 100 feet from the dock-line of the river. The intention was to put a damp-course on a properly prepared bed of 6 inches of concrete; this course to be waterproof, and on top of the damp-course 18 inches of concrete, this having been computed to be of sufficient strength to resist the upward pressure of the water. The cellar was about 48' x 70' in area. The theory was that if the damp-course were not punctured, the only work the upper layer of concrete would have to do would be to act as a medium to resist the hydraulic pressure; however, lest a leak might occur in the damp-course, this top layer of concrete was to be made most carefully, it having been the speaker's opinion that the concrete in it would keep the water out. The speaker was present during the greater part of the time when this concrete was being mixed. The job was done continuously, and, in that manner, no unfinished edge was permitted to set. Some six weeks after the completion of the job a sweat appeared at the lowest part of the cellar, which had been graded so as to permit baling out in case water might gather. At the end of another week several pailfuls of water had gathered, and, from that time on, the water found its way into the cellar at the rate of about a pailful a day. There was no question but that the waterproofing had been punctured, and also that the water had found its way over the concrete, but what surprised the speaker and caused him to conclude that his ideas as to the imperviousness of any concrete required revision was, that when he went to trace the source of the stream the puncture was found 18 feet from where the dampness appeared upon the surface. Several attempts were made to repair this leak, but with no success, and the whole was finally removed, with the exception of the bottom layer, which had served as a bed for the waterproofing.

This cellar was made over twice again with the same result, costing the contractor more than five times the amount of his contract. The cellar was built finally in a different way. On top of the waterproof layer, a layer of brick in a bituminous mortar was placed, and 15 inches of concrete placed on top of the brick. This was successful, and the cellar is perfectly tight to-day. The concrete used for the layer was composed of one part Saylor's Portland-cement, two parts Cow Bay sand and four parts small broken stone. The speaker believes that the stone was not greater than 1 inch in diameter. Then there was a 2-inch cream of Portland-cement and sand floated on, for a finished surface. The concrete was mixed to a consistency that caused it to sweat when thoroughly rammed.

The concrete was mixed as follows: The sand and cement were first mixed and wet, the wet broken stone was put on top, the whole turned three times and the entire batch put in place within thirty minutes from the time mixing began.

Some of the remarks made in reference to this subject bring to the speaker's mind a paper which he heard read last spring, by Mr. Maximilian Toch, at a meeting of the New York Section of the Society of Chemical Industry, on the preservation of materials of construction, in which was propounded a theory which so interested the speaker that he suggested to Mr. Toch that a like paper read before the American Society of Civil Engineers would be productive of considerable discussion and most likely lead to valuable results.

The theory advanced by him was this: A thin layer of very fine cement, entirely free from all the elements that cause or aid oxidation or disintegration, can be applied so that it will change the initial condition of the surface exposed to dampness, so that, instead of being porous, or exerting capillary action, the effect upon the moisture or water would be similar to the action of oil on water, causing a repulsive, instead of attractive, influence. Mr. Toch was assisted in the preparation of this paper by Clifford Richardson, Assoc. Am. Soc. C. E., and the results that they had attained made the speaker believe that the theory was quite plausible.

The matter referred to interests the speaker in his building work, and he has used this material since as a cement wash on the surface of a building in New York City. It has now been in place some three months, and, so far, it appears to have kept out the moisture where, before that time, dampness had penetrated. It differs from the ordinary cement wash in that it sets almost immediately, does not flake, and is not washed off by the rain.

There is a possibility that concrete can be made impervious to water or dampness by an application of this kind, and this is a matter worthy of the best study that can be applied to it. In order to make it impervious, it would be necessary to apply this wash on both surfaces of the concrete.

Edward Cunningham, Esq. (by letter): The writer recently made some tests for waterproofing mortar, which, though crude, were entirely satisfactory.

Using the materials at hand, two vessels, having an internal diameter of 11½ inches and an outer diameter of 12 inches, and about 26 inches deep, were made in the following manner: A sheet of "chicken wire" was rolled and wrapped with wrapping paper. This was placed on a square board and filled with sand, making a heavy core. A split 12-inch terra-cotta side-collector pipe was used for an outer shell and placed about the core, leaving a space of approximately ½ inch between the core and the pipe. This space was then filled with rather wet mortar, which was worked down by "ramming" with thin narrow sticks. When filled to the top, a bottom was formed over the sand core. Mechanically, the two vessels were as nearly alike as they could be made from such simple materials. The paper was not a so-called waterproof paper. The pipes were slightly greased before placing, in order to prevent the cement from sticking.

The mortar placed in the first vessel was of the ordinary 2:1 mixture, in which was used Allegheny River sand, as it came from the pile. The mortar for the second vessel contained the same proportions of cement and sand, with the addition of one per cent of the weight of the sand and cement in powdered alum, and one per cent of the weight of the water in yellow soap. The alum was mixed in the sand and cement while dry, and the soap had been dissolved in the water.

The difference in the texture of the two vessels, when taken from the forms, was very noticeable. The waterproofed vessel was fine-grained and close, and was much smoother to the touch than the other. Lids of roofing slate were "rubbed" on after putting a ring of neat cement around the top, in order to prevent evaporation.

After about three months the vessels were filled with water. The vessel made of the plain mixture immediately began to sweat, and "pin-holes" to weep. On damp days this was very noticeable. On dry, windy days the water on the surface of the vessel was apt to evaporate as quickly as it seeped through. The soap and alum vessel developed two or three "pin-holes," which showed slight weeping, otherwise it was dry. Without any records, the writer's recollection is that while the plain vessel was losing about 12 inches the other vessel lost about 1 inch, and that was through the "pin-holes," the surface never appearing generally damp.

In plastering the inside of a covered clear-water well, a potash soft-soap was used. The water for the plaster was used from a barrel into which one and one-fourth pounds of soap was put for each five buckets of water. The alum was used from paper bags by the mixers, a bag of alum to a bag of cement. As the walls leaked badly the contractor did this part of the work conscientiously. The mortar was fine to handle with the trowel, but the masons frequently were nauseated by the odor, had to come out to ventilate themselves.

Two plastering coats were applied, both being not more than ½ inch thick. The writer's instructions were simply to cover up the stone and make no attempt to bring it to a surface. There was seldom more than ½ inch in the coating.

[1] *Annales des Ponts et Chaussées.*

The results were entirely satisfactory. The application was made when there was no leakage; and, when rain set in, in the fall, the walls remained almost entirely dry.

In the filtered-water regulating houses the 18-inch dividing wall showed no leak when one side held 16 feet of water. In the clear-water well there was slight leakage at the joint between the work from the floor, and that from the scaffold.

There are some soaps in which the potash is much stronger than in others. The "old-fashioned" soft-soap, made on the farms, from soap fats and wood-ashes, is one kind of potash soap, and has a dark color because clean fats are not used. The soap used by the writer was white, because made of clarified fats, and was expensive — seven and one-half cents a pound — but should be obtained for much less. It came in bulk, in barrels.

Using one part cement to two parts sand, it takes from two to three twelve-quart buckets of water for each barrel of cement to mix mortar to trowelling temper. Concrete requires from six to eight buckets of water. The wetness or dryness of the sand (except the very extremes) may be disregarded, as laborers will vary the quantity of water, from batch to batch.

Lehigh cement is put up in bags of ninety-six pounds each. When mortar is mixed in the proportion of 2 : 1 there will be approximately 100 pounds of cement to 200 pounds of sand, therefore the alum was put up in three-pound bags, and one bag of alum was used with each bag of cement.

Therefore it takes 3 × 4, or 12 pounds of alum to each barrel of cement in 1 : 2 mixtures.

The extra cost would be: —

Soap, 2 lbs. (with 8 buckets, or 200 lbs. of water) at 7½ cents....	15 cents.
Alum, 16 lbs. (with 1 : 3 mixtures) at 3½ cents..................	56 "
Extra cost per batch of concrete..........................	71 "

In a concrete proportioned 1 : 3 : 5, each batch will make about .75 cubic yard of masonry in place. At that rate, the extra cost would be, approximately, $1 per yard. But both soap and alum, in larger quantities and in grades not as fine, should be obtained for much less money.

The writer, however, does not believe that it is at all necessary to build a concrete wall in this manner, as a 2-inch mortar face should be ample. In the filtration works at Apollo, a skin averaging less than ½ inch in thickness seemed to be sufficient.

W. K. Hatt, Assoc. M. Am. Soc. C. E.: Various solutions have been used to render concretes water-tight, or to protect stonework. Some of these solutions form the basis of patents granted for the manufacture of artificial stone. The speaker has experimented with two of these: silicate of soda, and alum and soap. The silicate of soda, called water-glass, is used locally in Northern Indiana as a surface coating for reservoirs and water-cisterns. The soap and alum solution has been used for some time, as alternate coatings for the surface of masonry, under the name of Sylvester's wash.

Alum forms the hardening agent of many patent mixtures for making artificial stone. One patent, granted in 1876 to L. L. Leathers, for artificial stone,[1] prescribes a mixture of cement and sand moistened with a solution formed of a mixture of fat and lye with alum.

The speaker was confronted a few years ago with the problem of designing a mortar for use in forming the segments or plates out of which burial vaults are moulded. These burial vaults must be water-tight, and since the expense of freight soon limits the area to which shipments may profitably be made, the mortar should be as light as possible. The conditions were met by a design of a mortar of two cement, and five fine bituminous ash made into plates strengthened by ordinary poultry mesh. Experiments were conducted with silicate of soda, and with the alum and soap solutions, to determine the effect of these on the strength and porosity of the mortar. The following results, in general, are of interest:

The effect of silicate of soda is to diminish the strength of both ash and sand mortars more than fifty per cent, and to diminish the absorption of the ash mortars about fifty per cent.

The effect of alum and soap mixed in with the mortar at the time it is gauged is to strengthen and harden the ash mortar about fifty per cent and to diminish its absorption by fifty per cent. A soap solution alone will diminish the absorption (by the action of the alkali in the cement on the soap) but will not increase the strength.

The strength of the sand mortar is not greatly affected by the soap and alum, but its absorption is decreased about fifty per cent. The effect on the absorption was measured by comparison of the weight of water taken up by briquettes which were immersed after having been dried out. Check tests were made by measuring the water which percolated from the outside through the walls of hollow cylinders.

The speaker believes that this is the first use of a soap and alum solution for waterproofing, in place of the usual gauging water.

The method used by the speaker is as follows: A five-per-cent solution of ground alum and water is prepared; and a seven-per-cent solution of soap and water. The alum solution is mixed with the mortar to the amount of one-half the ordinary gauging water. The soap solution is then applied in amount to bring the mortar to the desired plasticity. The soap and alum, acting together, cause the precipitation of an insoluble compound in the pores of the mortar.

A solution of lye and alum is said to produce the same effect.

In regard to the problem of making pipes, the French engineers believe that in order to make a concrete pipe hold water, a sheet-iron tube must be placed inside of it when the head is about 50 feet, and such pipes have been used under a head of 300 feet. When the head is less than 50 feet they make a reinforced concrete pipe without any steel lining.

[1] Letters Patent No. 178 307.

J. James R. Croes, Past-President, Am. Soc. C. E.: The proposition for discussion is whether it is possible to make concrete which will be impervious to water. This is a very different thing from making an existing mass of concrete impenetrable by water. The latter requires only the application of an impenetrable coating to the surface of the mass. The former requires the entire interior composition of the mass to be such that water will not percolate through it at any point.

That a small mass of concrete can be made which will be entirely impervious to water, is incontrovertible. The question is, whether, in practice, a number of such small masses can be united in such a manner that the joints between them would be impermeable, also. Theoretically, there is no doubt that they can. Practically, the difficulty is in securing proper manipulation of the materials, at a reasonable cost, and it is to be hoped that the discussion of the subject here will elicit descriptions of methods used by various practitioners in constructing large masses of concrete, and statements of the results obtained, both as to efficacy of the means used and the expenditure required to produce certain results.

But the mechanical combinations and the manipulation of the materials required to reduce the void spaces in a mass of fragments of different materials to a minimum and thus prevent the percolation of water, are not the only points to be considered. Chemical changes take place in materials thus compounded, and, of late years, studies have been made of the action produced by the introduction of other substances than stone, sand and water, into the composition of the mass which is to be made impervious, producing chemical action which reduces the porosity of the mass. It is to be hoped that anyone who has taken part in investigations of this kind will contribute to this discussion.

Mr. Cunningham's communication refers to an application of the Sylvester process, which was invented about sixty years ago and was used with success on the exterior walls of buildings. It was applied to the gate-houses of the Croton Reservoir in Central Park, New York City, and is described in the *Transactions*[2] of this Society. That was a wash of soap and alum applied to the surface of a brick wall to prevent the percolation of water through that wall. In the case mentioned by Mr. Cunningham the experimenter mixed all his materials together, that is, the soap, the water and the alum were put in as constituent parts of the mortar itself, and the chemical action, which in the case of the wash occurred only on the exterior of the wall, was made applicable to the whole interior.

In the case of the cellar mentioned by Mr. Lowinson, an impervious material was placed between the layers of concrete. That was not making concrete impervious to water, but was simply keeping the water away from the concrete.

The question is, can the concrete itself be made impervious, and it seems to the speaker that the experiment mentioned by Mr. Cunningham is a most interesting one, and one which is capable of further amplification, that is, of producing the chemical change in the constituents, so that when they are all mixed and placed together, the water will not penetrate them. Chemical action takes place in the whole of the wall, and, somehow or other, the pores are filled up by the addition of the soap and alum.

Now, can we not make a concrete which contains some materials which will act together chemically? The composition of concrete is purely, or almost entirely, mechanical. Can some substance be introduced into the concrete by which a chemical change will take place, which will make that concrete thoroughly impervious to water? This experiment indicates that such can be done.

Although masonry is impermeable to water, a crack may occur in it the same as in concrete. It is desired to make the concrete itself, in the mass, impermeable to water, but cracks cannot be prevented from occurring on account of unequal settlement, without very great care in construction. What is wanted is a material which, when made in a large mass, will be impermeable to water, provided it does not crack from unequal settlement, or expansion and contraction. Either wall or either material may be impermeable, but if a crack occurs, the water will go through it.

DEFECTIVE VISION AND ARCHITECTURE.[3]

I READ very lately that, in the opinion of an eminent oculist, a great deal of the defective eyesight which is annually becoming more prevalent in towns is due to the fact that these urban dwellers look so seldom on the pleasant restful green of the woods and fields, and so constantly on dull bricks and mortar, and if this opinion is well founded, it might undoubtedly make us give more consideration to the prominent tints which we use for both the insides and outsides of our dwellings. The condition of the brain is

[2] *Transactions*, Am. Soc. C. E., Vol. I, p. 203.

[3] Extract from a lecture by J. Slater, F. R. I. B. A., before the Sanitary Institute Congress at Bradford, Eng., July 9.

seriously affected by the state of the nerves of the eye, and the undoubted increase in diseases of the brain of late years may possibly depend, not only on the hurry and bustle of the daily life of the average business man, but also upon the dull, gloomy, repulsive nature of his outlook for so many hours of the day. Just as light causes us to feel cheerful and warmth makes us feel comfortable, so I believe it will be found that color in soft graduated tones has an immense effect on our well-being. Staring, garish, inharmonious tints must have a somewhat similar effect through the eye on the brain, as loud cacophonous sounds have through the ear, and, strange as it may sound, I firmly believe that it is almost as essential for the construction of healthy homes that the tints of the woodwork and the wall-coverings should be considered as that the drains should be properly laid. Why is it that, however luxurious and well furnished a house may be, we frequently feel a sensation of fatigue when we pass an hour or two in its rooms, whereas in another we feel restful? Often, I believe, because the nerves of the eye are strained and wearied. And here certainly is an opportunity for the builder to adopt sanitary methods rather than unsanitary ones at practically no expense at all. Instead of the haphazard arrangements of wall-papers, without any consideration of the aspect of the room and the quantity of light which it enjoys, a very little knowledge and thought would show that neutral tints are desirable in rooms which get a large quantity of sunlight and warmer tints for north-facing rooms. This consideration leads me to my next point, viz, the enormous importance of paying proper attention to aspect. The immense value of sunshine, especially in these northern latitudes, cannot be too strongly insisted upon, and in this respect it appears to me that the large blocks of artisans' dwellings which have lately been erected in so many cities lamentably fail. As a rule, particularly in the cases where the municipalities build these dwellings, and the cost is charged to the rates, care is taken that all the blocks have an ample air-space between them, but even with the London County Council, whose artisans' blocks are excellently designed, well-built, and with plenty of air-space, the height to which they are carried makes them dull and somewhat gloomy. Of course, here again the question of cost comes in, and generally where old buildings have to be pulled down and insanitary areas cleared away, the capital expenditure becomes very large before a brick of the new buildings is laid, and in order to accommodate a sufficient number of families to obtain a rental that will give any return at all upon this expenditure, the buildings must be carried to a great height. I do not believe this can be done without prejudicially affecting the health of the inmates, especially the children. No doubt the conditions of life are infinitely superior to what obtained before, and the enforced cleanliness and general submission to regulations cannot but have an excellent effect on the dwellers in these buildings; and the mortality is admittedly low. But I should be sorry to see these huge blocks multiplied in the heart of our great cities. The object should be to get the workers away from their work when it is finished by increasing the facilities for quick and cheap transit.

The startling development of electric traction, which is the most marked feature of these last few years, offers a solution of the difficulty. I do not think the time is far distant when it will be the exception, and not the rule, for the workers to live in close proximity to their work when this is performed in crowded areas, and this would result in an enormous amelioration of the average health of the people as well as a fresh increase in the output of their work. There can be no doubt that the success of the bold experiment of which such places as Port Sunlight are the result, will encourage other large private firms to follow this example, and that manufacturing industries will have a tendency to be carried on at a distance from our large towns; but there must always be a large army of workers connected with the distribution and not the manufacture of commodities who will be compelled to carry on this work in the daytime under somewhat depressing conditions, and for these will come salvation in the shape of the tramway or the light railway. It is in this direction, combined with the erection of good small houses, amid bright and cheerful country surroundings, that I hope municipal enterprise will soon be turned. If some such policy could be carried out, just think how far-reaching would its results be. I sometimes look at the costly, well-equipped Board Schools, which have been erected in thousands during the last thirty years, and when I see these places, as they often are, in the most dingy and depressing surroundings, I wonder how the children who attend these schools can possibly grow up healthy. Asphalted playgrounds, surrounded often by high walls, where the only view is of bricks and mortar, are not the ideal training-ground for the future mothers and fathers of the people. You have only to compare the pale faces and weakly forms of the town-bred children with the ruddy bloom of those who are in the country, to see what an advantage the latter have, and I look forward to the day when all the elementary education will be carried on away from the large towns. You will think that I am wandering from my subject, but while on the question of schools there is one matter which I have very much at heart, and which I have more than once alluded to in other places, and this is directly relevant to the subject of this address. I have been speaking of the outer surroundings of our elementary schools, but turn to the inside; these buildings are well-built and well-found in all respects, but are they beautiful? As a rule, perfectly plain walls, with no decoration on them, are all that you will find. Could not this be altered and improved at practically no cost at all to the ratepayers? There is scarcely a large city in the kingdom that has not its art school, where most excellent work is done in painting, modelling, ironwork, etc., founded by the ratepayers and under municipal control. Why should not the art-school students be employed in decorating the Board Schools? It would be far better practice for a student than merely designing and painting a colored decorative frieze to be placed he knows not where, that he should, of course under the guidance of the art master, take an actual classroom and decorate it well. Or why should not a modelling student design and carry out some plaster enrichments or a little statuette for a niche? It might all be done as part of the work of the session, as I said, at no appreciable cost at all. And just think of the effect on the Board School children of spending so much of every day in surroundings which are bright and cheerful and which would teach them to know and appreciate what is beautiful! Their work would be better done, their characters improved, their minds trained unconsciously, and undoubtedly their physical health would be better. I might considerably amplify these remarks, but I cannot do better than conclude with a quotation from the old Greek philosopher, Plato, who says: "In the case of our artists, the bad habit must be stopped of depicting in statues or buildings or any other artistic production, what is coarse or illiberal or ugly. If a man cannot refrain from this, we must forbid him to produce anything, lest our children, if reared among images of evil as in a bad soil, drawing their impressions one by one from many sources every day, may unconsciously establish an evil precedent in their own souls. We must rather seek for artists to trace out what is beautiful and noble in nature, and thereby enable our children, like plants in a good soil, to be assisted by their environment, so that whatever meets eye or ear from these beautiful works may, like a health-bearing breeze, lead them unconsciously from their earliest years to love and be in accord with beauty and reason." These words are as true now as they were 2,500 years ago.

It is impossible to over-estimate the good which has been done in the last thirty years by the Sanitary Institute, by its examinations, its publications, and not least by its Congresses, which do so much to spread abroad in all parts of the country a knowledge of the principles of sanitation; and if its founders could see the results achieved, they would feel fully repaid for their exertions. But there must be no cessation of activity. Very much has been done, salient abuses have been abolished, and an excellent foundation has been laid, but the superstructure has yet to be erected. And every one can help in the work. It cannot too often be dinned into the ears of the governing bodies that upon the health of the people depends the wealth and well-being of the nation, and the suggestions which I have thrown out will, I hope, show you that the health of the people depends upon very much wider considerations than the mere regulation of drains and ventilation, and that architecture, not only on its constructural side but on its highest and artistic side, has a closer and more intimate connection with hygiene than might be at first sight supposed. — *The Builder*.

BOOKS AND PAPERS

IT seems quite a lifetime since we all wrangled and squabbled over the annual exhibition of the Impressionists in Paris. "What in the world *can* you see in those hideous things?" said some: while others found the said things all that art should be. The show was the artistic battlefield of the day. It was in a sense very popular, because it afforded half an hour's diversion — and the work of Manet and his friends was visited much in the same manner as Monsieur Guignol or the Palais Royal theatre, to raise a laugh. M. Durand-Ruel believed in the movement, and believing in those days meant being a tremendous partisan. How we have changed! Now any one can see for himself at the Luxembourg Gallery the merits and demerits of the school.

M. Camille Mauclair's book [1] is translated, not very satisfactorily, by P. G. Konody. "It is here where he . . . " is not quite grammatical, and using "or" thus: "or, color being simply . . . " is certainly not English — presumably the translator meant "thus"; "f. i." may possibly be intended as "for instance"; but the French "par exemple" might be rendered as "for example," or by i. e.. The translator also uses "school" when he means an academy (école); and "Académie" for academy (a body of artists). Some other errors are: "the charm of his force," "he submitted the most perfect epitome of his atmospheric researches," "a great personality *who* knew"; they exhibited in "hired apartments."

The early Impressionists were rebels against Classical shams. Just as the pre-Raphaelites went back to the Primitives to get truth, so the Impressionists found truth in absolutely copying Nature. Whereas Millais, Mr. Holman Hunt, and a host of others, religiously copied each leaf of a tree, each twist of a stalk, the eyelashes of a face, so the Impressionists, Manet at their head, took pleasure in painting every detail of the "Bar at the Folies-Bergère," or the "Déjeuner sur l'herbe." So, too, Nature was depicted in her ugliest moods; rather, may we not say, she was distorted, for Nature is never absolutely ugly. But such works as the "Spaniard," the "Reader," the "Dead Toreador," and "Le Fifre," not only prove Manet to have

[1] "*The French Impressionists.*" By Camille Mauclair. London: Duckworth & Co. 3*s*.

been an original painter, but stamp him as a reformer from the stagnation into which a good deal of art had sunk half a century ago.

Manet was the great innovator — he led the way for Degas, Renoir, Monet, Sisley and the Neo-Impressionistes. The pity of it is that they delighted in ugliness for its own sake, and eccentric compositions. For example, because a head painted out of doors takes green reflections from the trees, is it necessary to paint the face in bright purple for shadows, orange lights, and emerald green cheeks? Such coloring may be true, but is it necessary to place your model in such a position as to oblige this treatment? Surely one quality of art is selection? There are many effects in Nature which transferred to canvas make very poor art. Some of M. Degas's ballet pictures, for instance, are charming as color, but why have painted the girl and her mother called "Waiting," from an eminence just above their heads, as if the artist had seated himself in a chair suspended from the ceiling?

The manner of work is unpleasant in the newer school. No doubt the placing of patches of bright colors in juxtaposition to one another, instead of mixing them, gives far more sunlight; and M. Claude Monet, Henri Martin, and others, demonstrate the fact in their work. But, inasmuch as it is necessary to place one's self at a great distance for the different tones to amalgamate, such theories carried to extremes do not work out well for pictures which are to be placed on the walls of small rooms — they become patchy. "Light," says M. Mauclair, "becomes the sole object of the picture." That is true; but we cannot forget that paints are not sunlight itself, and cannot reflect the rays of the sun (the translator writes refraction); at best, one must substitute something which conveys the idea of sunshine, and such painters as M. Montenard and others who depict the South, have shown a method that is happier than the Impressionists,' which is so fatally wanting in repose.

M. Mauclair defines Edouard Manet as a "beautiful painter," because apparently he "painted without bitumen, without glazing, without tricks." That he was an original painter waging war against mere prettiness and false sentiment, we may concede; but that he ever worshipped beauty as the rest of the world conceives it is certainly not possible to believe; and as to other painters' methods, surely bitumen is essentially a pigment of the past. Had Manet not gone out of his way to be eccentric and hideous (see his frames cutting off half a head, or the top of it), he might have been one of the leading painters of the time; but the vulgarity of his models, and even of his coloring, prevents him taking a place above the other Impressionists, although he fought the first battles. Degas was a better colorist — his greys and pinks are delightful, and force one to see poetry in his ballet subjects in spite of the common type of women he depicts. His "Horses in the Meadows" make one wish he had been an animal painter. M. Mauclair considers that Renoir's "Box" recalls Reynolds. A woman of vulgar Parisian type in evening dress and a child with a bouquet, certainly "recall" to no one else the refined grace of a Reynolds, whose portraits are those of ladies, whether the originals were so or not.

The Impressionists are to be praised for following their convictions; they were original thinkers and original workers — men of power having consciences which guided them towards what they held to be truth — whether their work is absolutely truthful is doubtful. In so far as an impressionist work is one, which, when it has conveyed to the beholder the impression felt by the artist, need go no farther, in other words, a sketch, it is good. Finish for the sake of finish is bad; but equally bad is the eccentricity which is the foster parent of notoriety, and it is difficult to absolve the older members of the school and the Neo-Impressionists of this vice. Composition they threw to the winds, emulating the principles of Japanese art; but they forgot that a Jap painter always places his figures and plants exactly where they should be to make a successful decorative composition. However, art probably owes much to Manet and his followers, for they saved us from decadence through false sentiment, and above all, they took us out of a groove and made us take Nature as we found her.

MR. F. T. HODGSON'S useful little book[1] on the Steel Square has been rewritten and expanded into a work in two convenient volumes, proving, as its author claims, with good reason, "an encyclopedia of steel-square knowledge." It is needless to say that no one has yet exhausted the possibilities of usefulness of what Mr. Hodgson well calls "that wonderful instrument, the American steel square," and his book, comprehensive as it is, will suggest to the intelligent reader, still more extended applications. To mention only a few of the uses to which it can be put, Mr. Hodgson shows us how to calculate with it the tensile strength of different steel rods; the cost of lumber, the distance of an inaccessible object; the height of a tree or building; the accuracy of a semicircle; the side of an octagon, hexagon or various other polygons, and so on, besides the familiar measurements of rafters, hips and valleys. Considering the importance of the steel square to every worker in wood, it is not surprising that, as Mr. Hodgson tells us, several hundred thousand copies of the various editions of his book have been sold. The demand, as he tells us, shows no sign of diminution, and the new edition is so much more comprehensive than the old ones that those who have read the latter will certainly want the other.

[1] "*A Practical Treatise on the Steel Square and Its Application to Everyday Use.*" In two volumes. By Fred T. Hodgson, Member of the Canadian Association of Architects, Author of "*Modern Carpentry*," etc. Chicago: Frederick T. Drake & Co., Publishers. 1903. Price $2.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

A COMPETITIVE DESIGN FOR THE IMPROVEMENTS AT THE U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. D. H. BURNHAM & CO., ARCHITECTS, CHICAGO, ILL.

A STUDY of the ground on which the United States Military Academy is located leads to the belief that there is one main axis superior to all others for a monumental treatment of this post. When one stands on the balcony of the Observatory, from which is obtained a broad view of the Government domain and the surrounding country, this belief is confirmed, for this axis is the natural one in the landscape. It begins on the east side of the river, and, passing across the water, bisects the plâteau which forms the parade-ground, and then passes upward toward the mountains of the background through a dip between the foothills that lie at their feet. It has seemed wrong to neglect the course to be pursued when Nature herself has so plainly indicated it. It therefore becomes a question whether one should adopt any compromise offering an inferior solution of the problem, and it would be a compromise to attempt to retain many of the buildings already erected when an ideal design is plainly possible for both the practical and beautiful sides of the problem. And because this work is to be for all time, we have, after much hesitation, come to the conclusion that we should present that scheme which will ultimately bring about the noblest results rather than that which at best must ever be unequal to it. The main reason for this choice lies in a conviction that order and system of a high quality surrounding a young soldier will strengthen within him a respect for law, so far as environments can affect him.

The design has three principal divisions: —

1. The central one, having to do most directly with the life and training of the cadets of the United States Army.
2. That at the left, having to do with the life of the officers on duty and with visitors, in short, with the social side of the post.
3. That part at the right, which has to do with enlisted men, the commissary, and the more essentially working parts of the post.

These three divisions have been made in order that the men of each section may, as far as possible, carry on their distinctive functions without interfering with the necessary activities of others whose duties do not commingle. These three divisions obviate to a great degree the necessity for using the parade-ground and the avenues in front of the Academy and barracks, for carrying supplies and for passing troops of men. For the same reason, the cavalry and artillery ground has been placed in the plain on the northwest of the post, conveniently near this section of the scheme.

The central part is on a grand axis running northeast and southwest, the cadet barracks on three sides of a square, in the centre of which is the Academic Building. The extension of the cadet barracks is to be used on one side for the Y. M. C. A. and the reception-room, and the museum and library on the other. These extensions complete the architectural treatment of the southwest and of the parade ground. The cadet courtyard is ample for all formations of the corps, and equally accessible to all the barracks. Behind the barracks is a plantation bordering on the drive that passes back of it. The cadet court is dominated by the Commandant's headquarters and those of the officers of the day, which are in the southeast part of the Academic Building.

From the cadet court through a broad arch, the way opens into an amphitheatre of a size that can easily be canopied, and where can be held large formal or informal gatherings of the cadets, of members of the army or of mixed companies of military men and civilians. This amphitheatre forms a sort of lower court to the sacred terrace above, on which terrace stands the house of God, properly placed there as the crowning feature of the grand design, high above all other buildings, but kept in strict relationship to them and upon the main axis. This church is reached by broad stairs and by a walk, furnishing easy access from the hotel and officers' town. From the cadet court under an archway and through a wooded alley access to the mess-hall is had. A similar passage is opened to the important cadet buildings on the right, the gymnasium, the riding-hall and the store.

The administration buildings and the gymnasium complete the northwest and southwest corners of the framing of the parade-ground, and they are connected with the main buildings by covered porticos. Behind each is a large elliptical fore-court. The two courts are arranged so that the finest distant views over the river are obtained from them.

Commanding the superb view of the Hudson River, a theatre has been arranged on the northwest slope; this is adapted to music, drama and athletics, and its situation is like that of the theatre of Dionysius under the Acropolis at Athens. It is this view, across the theatre, that greets the visitor at the main entrance on passing through the triumphal arch of the fore-court, at the southwest corner of the parade-ground.

It will be remarked that the orientation of this axis northeast and southwest presents great sanitary advantages, also that the mess-hall and hospital are retained, the Cullum Hall being lowered to a terrace below its present position.

The officers' and visitors' parts: This is naturally subdivided into two axes, that of the arrival and the common social life of officers and visitors, and that of the more intimate and exclusive life of the post. Passing through the natural landing-place, an axis traverses successive terraces until the hotel is reached. The visitor is thus greeted at once on his arrival and commands, during his approach, the view of the river, and from the hotel terrace the parade-ground. Grouped around this axis on terraces are the houses of those officers whose interests place them in relation with the outside world.

(2) Here is the heart of the officers' home; it is placed in touch with the park land of the southeast and follows in successive terraces and gardens the natural nest of the ground. Advantage is taken of the overflow of the reservoir to form a cascade and lake in the centre of this composition.

(3) The soldiers' town we have grouped around one court; the band-practice building and the commissary directly below. Facing the recreation-ground is the assembly-hall for enlisted men. The guard-house is on the axis of the court commanding the approach from north dock and a new freight station, the sources of supplies. To the northwest, in proximity to cavalry and artillery barracks, are the stables, within easy reach of both riding-hall, and cavalry and artillery ground.

As a frieze, the proposed scheme skirts the Point. In the centre is the Academy proper, to the south its command and instruction, to the north its service, connected, the one by the post headquarters and the other by the athletic group.

Thus, while seeking an ideal working scheme, the aim has been to preserve and enhance the natural beauties of the site, in our estimation the real basis of historic associations, nowhere obtruding the architectural to the detriment of the natural. We have chosen a background of hills as a frame for the composition.

Built largely of native stone, relieved in effect by smaller monuments of marble, the new Academy lies in harmony with nature, and is in itself a perfect organization.

CUBICAL CONTENTS.

(1) Additional cadet barracks. Four buildings, 275,000 cubic feet each; two buildings, 535,000 cubic feet each.
(2) New academic building, 3,975,000 cubic feet, including wing.
(3) Chapel, 1,020,000 cubic feet.
(4) Riding-hall, 6,400,000 cubic feet.
(5) Post headquarters, 550,000 cubic feet.
(6) Administration building of the corps of cadets, 185,000 cubic feet.
A — Reception-hall of cadets, 425,000 cubic feet. B — Museum and library, 425,000 cubic feet.
(7) Building for contagious diseases, adjacent to cadet hospital, 120,000 cubic feet.
(8) Cadet store, 475,000 cubic feet.
(9) Post-office, telegraph and telephone exchange building, 105,000 cubic feet.
(10) Building for bachelor officers' quarters, 130,000 cubic feet.
(11) Quarters for married officers:

53 buildings;	45,000	cubic	feet	each.
2 "	85,000	"	"	"
4 "	40,000	"	"	"
Apartment building,	400,000	"	"	"

(12) Main guard-house; 105,000 cubic feet.
(13) Post exchange and commissary building, 230,000 cubic feet.
(14) Cavalry barracks, 300,000 cubic feet.
(15) Cavalry stables, 600,000 cubic feet.
(16) Artillery barracks, 300,000 cubic feet.
(17) Artillery stables and gun-shed, 650,000 cubic feet.
(18) Cadet laundry, 190,000 cubic feet.
(19) Two fire-engine houses, 85,000 cubic feet each.
(20) Heating and lighting plant, 180,000 cubic feet.
(21) Hotel for 200 guests, 1,000,000 cubic feet.

PLAN OF THE SAME.

THE DOMUS VETTIORUM, POMPEII. MEASURED AND DRAWN BY MR. WM. L. WELTON.

Additional Illustrations in the International Edition.

ENTRANCE TO THE NEW GYMNASIUM, FRIEDENAU, PRUSSIA. MESSRS. ENGELMANN & BLUNCK, ARCHITECTS.

THIS and the following subject are copied from *Blätter für Architektur.*

THE RATHAUS, GUBEN, PRUSSIA. [XIV–XVII CENTURY.]

NO. 39 EAST 77TH ST., NEW YORK, N. Y. MR. CHARLES BRENDON, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGNS FOR CHAPEL: U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. PEABODY & STEARNS, BOSTON, MASS.: TWO PLATES.

COMPETITIVE DESIGNS FOR CHAPEL: U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. D. H. BURNHAM & CO., ARCHITECTS: THREE PLATES.

NOTES & CLIPPINGS

PROPOSED DAM ACROSS THE MISSISSIPPI. — There is a proposition to build another dam across the Mississippi River, this time at the foot of the Des Moines Rapids at Keokuk, to produce a water-power of 50,000 or 60,000 horse-power, which can be used for industrial purposes in all of the cities and towns in that vicinity, and at the same time furnish deep-water navigation for more than forty miles between Keokuk and Burlington. Engineers who have studied the proposition consider it not only feasible, but as promising great advantages to all that section of the country. They not only recommend but predict the construction of other dams up and down the river for similar purposes in the future; one which will perform a like service, furnishing water-power and navigation between Rock Island and Clinton, another below Prescott to create deep water between St. Paul and Lake Pepin, until the entire upper Mississippi is harnessed to electric plants and distributing its mighty power over wires through the States which lie upon its banks. This is the French plan, and France offers the best example for the development of internal water-ways. By the canalization of her rivers and connecting them she has secured an interior water transportation system of over 7,000 miles, one-third the mileage of her railways. The area of France is about 200,000 square miles, a little less than that of Wisconsin, Minnesota, Iowa and Illinois combined — the four States to be directly affected by the improvement of the upper Mississippi — and each of these States has several contributing streams no larger than those which now form a part of the French water-way system. In fact, engineers who have studied both situations assert that the canalization of the tributaries of the northern Mississippi will cost very much less than the $200,000,000 which the French Government has spent for a similar purpose. The traffic of the French canals is about one-third of that of its railways, and consists mostly of coal, iron and other bulky merchandise. Nor has the development of the system affected the railways unfavorably. On the contrary, the increase of business has been as much as they could handle, and, but for the assistance of the canals, there would have been frequent and embarrassing blockades. — *Boston Transcript.*

A STORY OF BANGOR CATHEDRAL. — The death of the Dean of Bangor, who was looking forward to the reopening of the choir of the Cathedral on September 3, after its redecoration at the expense of Lord Penrhyn, recalls a good story of the restoration of the Cathedral under Dean Vincent. The Dean was one of those who helped the late Mr. Henry Hoare, the banker, in his work for the revival of convocation. Mr. Hoare often stayed at Bangor. He used always to attend the early morning service, and one day complained to the Dean of the coldness of the Cathedral and its ruinous condition.

"Why do you not take steps to restore it?" said the banker.

"What am I to do?" said the Dean.

"Go and see Lord Penrhyn (the late), and tell him that I have not an acre of property in the diocese, and will give £1,000."

Mr. Hoare went to Carnarvon for the day, and at dinner asked his host how he had got on.

"Why, wonderfully," was the reply. "Lord Penrhyn was surprised I had not asked him before, and gave me £5,000 to go on with."

After that Lord Penrhyn gave immense sums to the Cathedral. — *Westminster Gazette.*

HOTEL LABEL COMPETITION. — The *Daily Messenger* of Paris, formerly *Galignani's Messenger*, has announced three prizes which it will give for the best hotel labels — 1,000, 500 and 250 francs, respectively. The designs in competition will be reproduced in December. It appears that tourists, being watched so closely that they find it difficult to abstract pieces of stone from historic buildings, bits of curtains from palaces, and toes and fingers from works of public art, have taken to collecting the labels which the hotel porter smears on trunks and valises as an advertisement of his hotel. The announcement is headed: "Open to Hotel Keepers," and begins: "The increasing habit among tourists of collecting hotel labels, and the value which tourists so often attach to having their trunks display a large number of labels has suggested," etc. This brings into grotesque relief the mentality of the average tourist, for it is not to be supposed that such a competition would be undertaken unless there were grounds for the belief that many travellers do really collect such things. It will be interesting to learn whether art will enter into the designs of a competition which is "Open to Hotel Keepers." — *Exchange.*

CREMATION LAST YEAR. — The number of cremations in the several countries during the year 1902, according to crematory statistics was as follows: the United States, 3,158; Germany, 856; England, 452; Italy, 322; France, 4,805 (of which 305 were paid for, the others being gratis); Switzerland, 217; Sweden, 66; and Denmark, 44; total, 9,920. The total cremations in the principal cities of Germany are given as follows: Gotha (1878–1902), 2,934; Heidelberg (1891–1902), 1,174; Hamburg (1892–1902), 1,014; Jena (1898–1902), 289; Offenbach (1899–1902), 323; Mannheim (1901–'02), 63; Eisenbach (1902), 17; total, 5,814. — *Consular Reports.*

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Classified Index Continued.

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SEPTEMBER 26, 1903

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VOL. LXXXI * REGULAR EDITION * NO. 1448

ARCHITECTURE

ENGINEERING

DECORATION

211 TREMONT ST.

BOSTON MASS.

CONSTRUCTION

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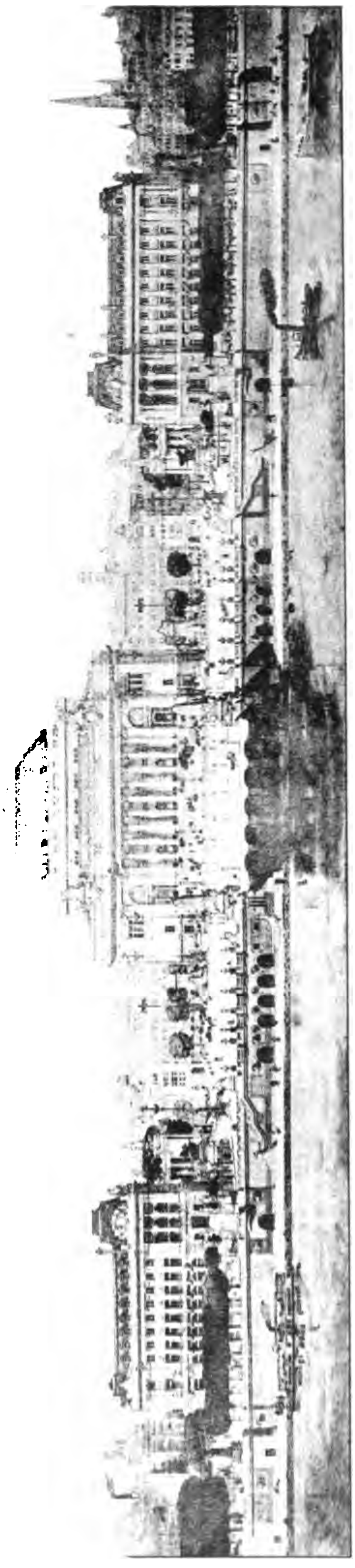

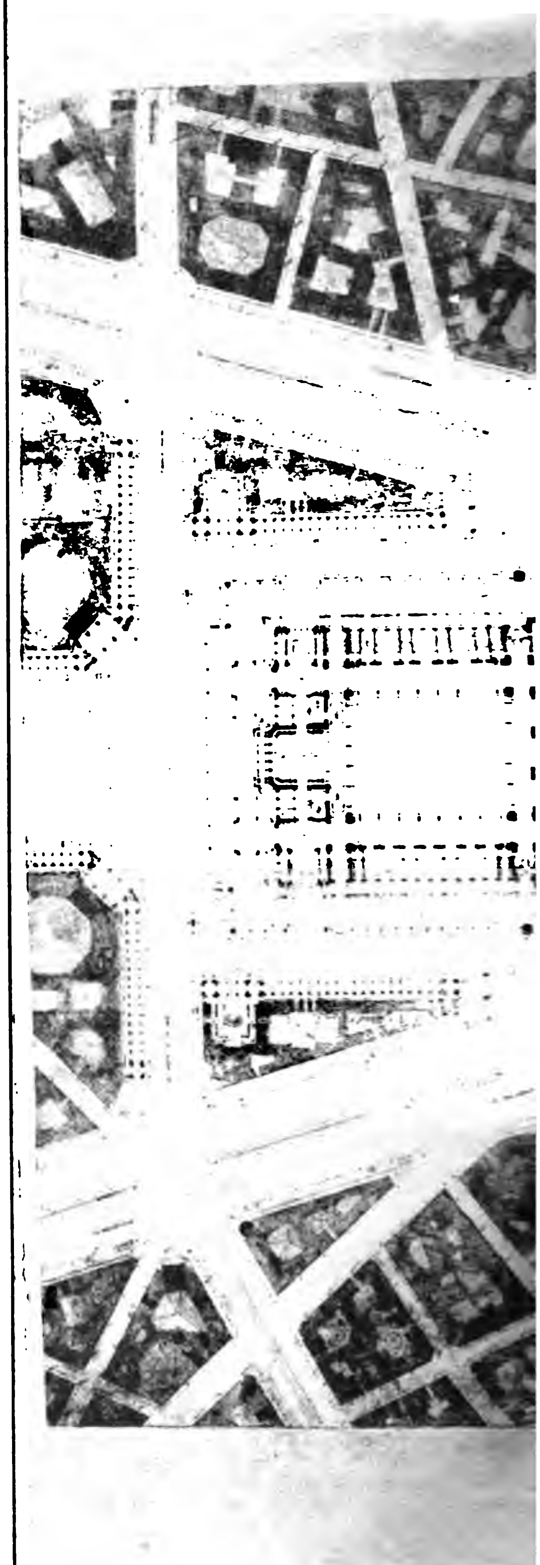

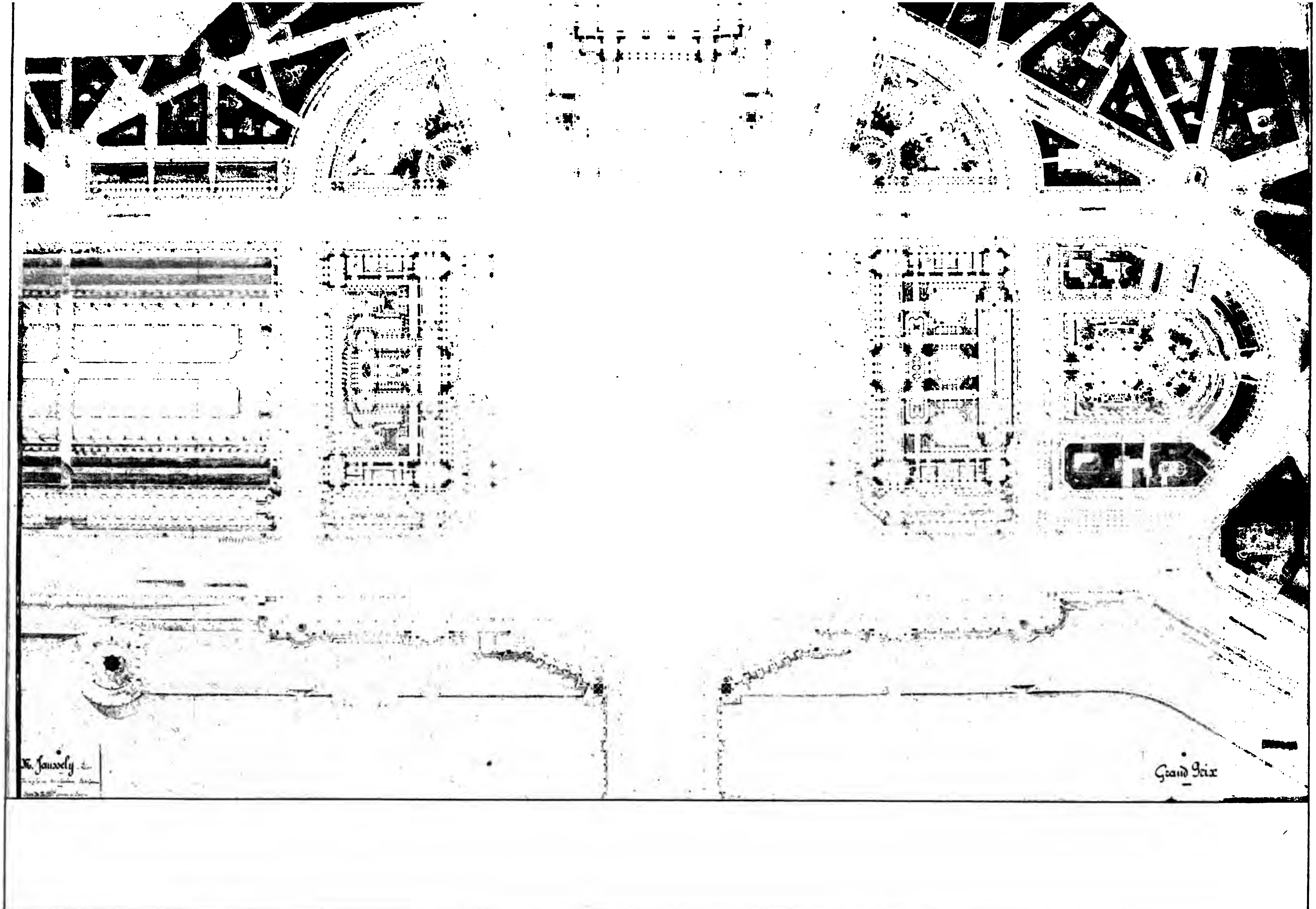

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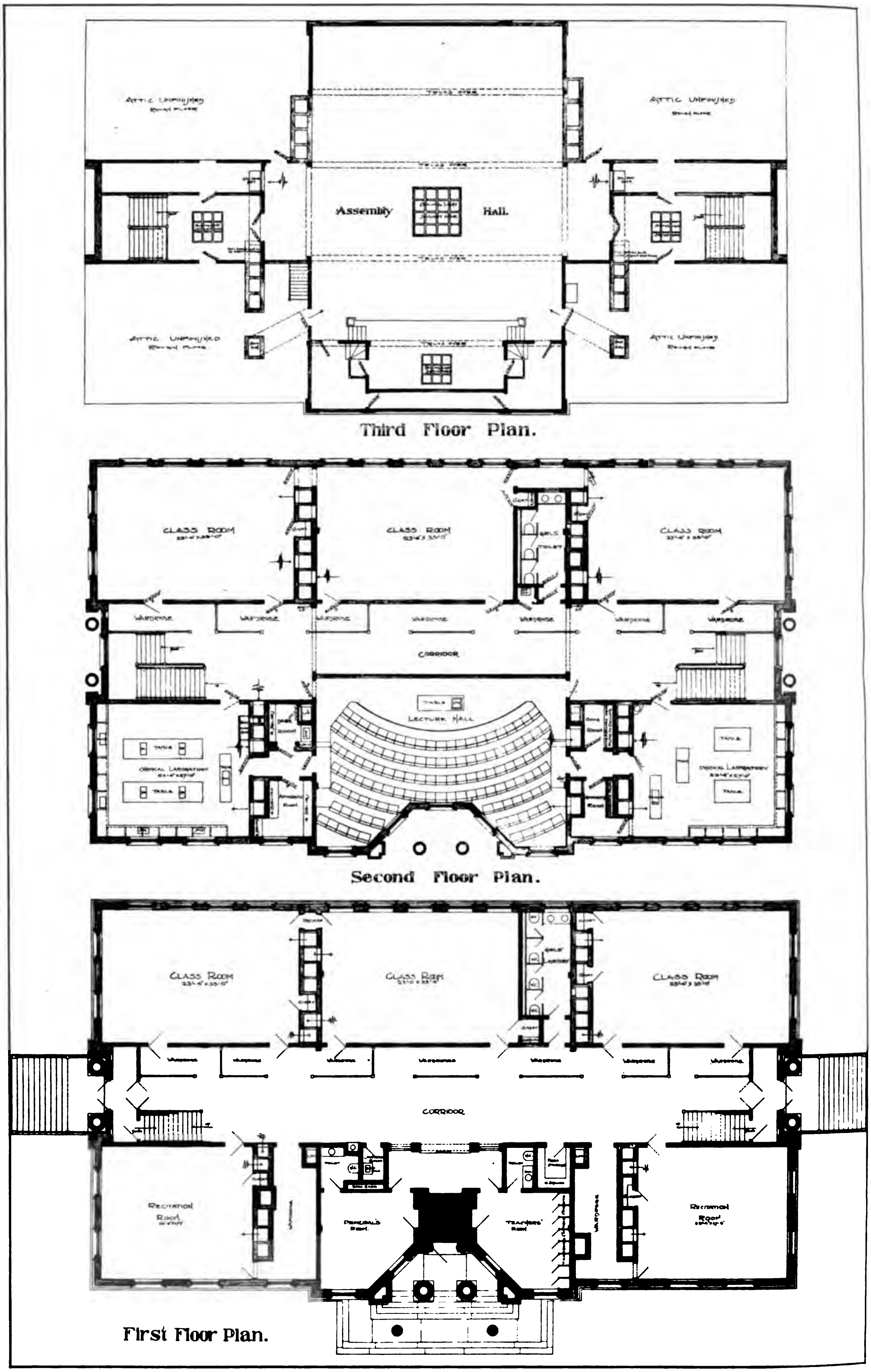

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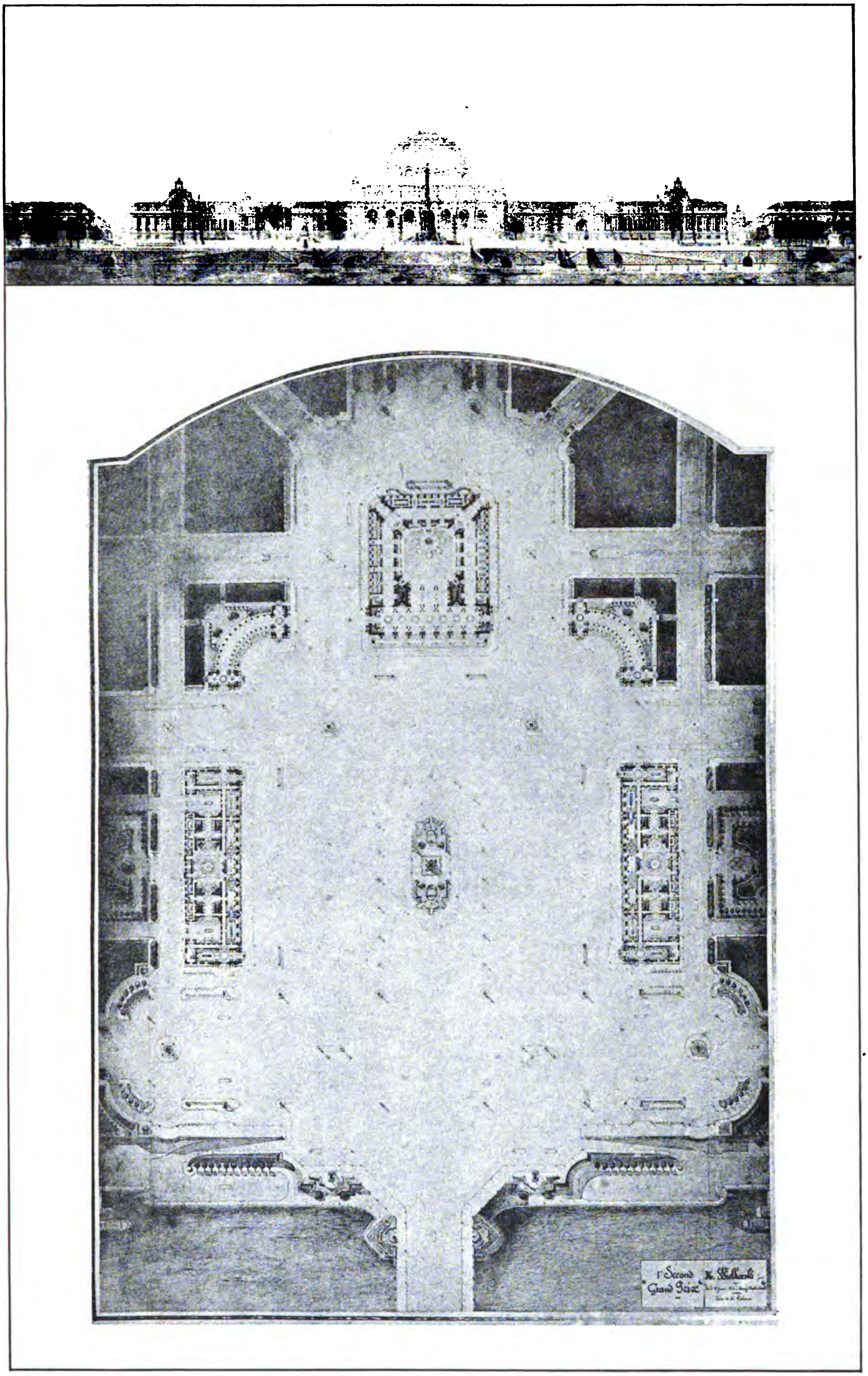

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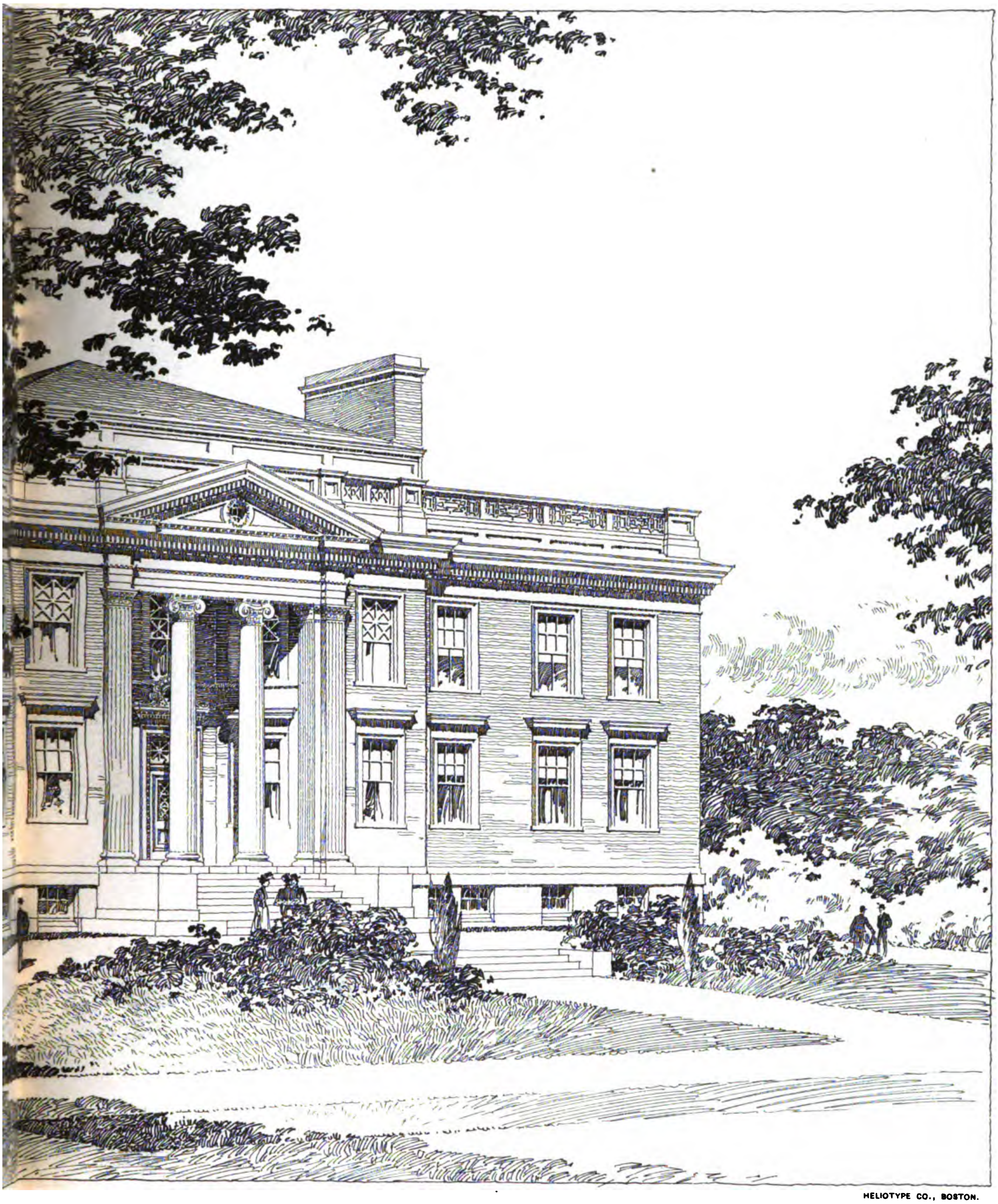

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LEXINGTON, MASS.

ARCHITECTS.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. LXXXI SATURDAY, SEPTEMBER 26, 1903 No. 1448

CONTENTS

THE celebrated insurance case of the Boston *Advertiser* building has been decided by the Supreme Court of Massachusetts, and all architects and real-estate owners will read the decision with great interest. It will be remembered that, in 1901, the upper portion of this building was destroyed by fire. Under the laws of Massachusetts, a building, of which more than a certain proportion has been destroyed by fire, must, if repaired, be made to conform to the statutes regulating building construction at the time the repairs are made. Between the time of the erection of the *Advertiser* building and that of its burning, the statutes regulating construction had been changed; and it was found that to restore it as the law required would cost about forty-six thousand dollars; while to restore it to the condition in which it existed before the fire would cost only about thirty-one thousand dollars. The owners repaired it as they were compelled by law to do, and called upon the insurance companies for the forty-six thousand dollars which it cost to do so; and the insurance companies offered the thirty-one thousand dollars which it would have cost to restore it to its original condition, but refused to pay more. The owners brought suit, and the highest court in Massachusetts has now decided that an insurance company, unless its policy, as in the case of the Rhode Island standard policy, expressly limits the liability of the company to what it would cost to replace the same building, is bound to take as its measure of damages the actual cost of replacement in accordance with the building-laws as they existed when the policy was issued. That is, as the court said, "insurance companies must take the risk of restoring property, not to exactly the same condition that it was in prior to a fire, but to as near that condition as the building laws will permit the owner to repair the property." One of the Boston papers remarks upon this that, as the insurance companies have been active in calling for stricter building laws, it is only justice that they should take the risk of paying the increased cost of rebuilding after a fire due to such laws.

THE Boston architects who have received notice that union bricklayers will not be allowed to lay brick upon foundations put in by certain stonework contractors will read with interest the accounts of the suits instituted by a firm of hatters in Danbury, Connecticut, against the hatters' union of that place, for boycotting of a very similar character. The hatters in question, Messrs. D. E. Loewe & Company, had refused to discharge, at the demand of the union, certain non-union men employed by them. The union sent notices to dealers in hats, advising them not to buy goods manufactured by Loewe & Company, under penalty of being themselves boycotted, and had in other ways injured the business of its victims. Now Messrs. Loewe & Company have appealed to the courts for redress. Many of the members of the union are property-owners, possessing, in many cases, houses and land. The property of these members has been attached in suits brought by Loewe & Company on two different grounds. In one set of suits a claim is made, under the State laws, for damages for injury to their business by unlawful conspiracy; and, in the second set, an action is brought under the Sherman Anti-Trust Act. As each member of an unincorporated union is individually liable for all the debts of the union, those members who have any property may see themselves deprived of it to indemnify the people whom their reckless and irresponsible leaders have injured; and, in any case, they will be compelled to face the annoyance of a lawsuit. Those members who have nothing to lose will, of course, look on complacently at the troubles of their brethren; but it should not take a great many lessons of this sort to make the sober and responsible members of unions in general more cautious than they are now about turning over their affairs to the management of the most reckless and foolish among them.

IT is reported that the American Federation of Labor proposes to meet the action of President Roosevelt, in reinstating Miller in the Government Printing Office, and in ordering that employment in that establishment shall not be restricted to union men, by a declaration of war, and to use, for the purpose of compelling the President to recede from his position, not only the means of coercion familiar to "organized labor," but the threat that, if he does not surrender, the influence of the unions will be exerted to prevent his nomination for the Presidency next summer. We may say, in the first place, that we doubt very much the truth of the story. The experienced schemers who control organized labor are generally too prudent to engage in any direct conflict that they can avoid. While they boast and threaten openly, where there is little chance of their threats and boasts being investigated, their real weapons consist of secret "deals" with politicians, underhand persecution, and vague terrorism, and it would be hard to find a man less likely to be influenced by any of these than our energetic young President. The American Federation of Labor, also, has lost much influence of late, even among organized union men; and a contest with the President of the United States would be little short of suicidal. However, it may be that its desperate condition is the very thing which disposes its leaders to risk everything in a desperate undertaking. If so, the struggle is to be welcomed, so far as citizens in general are concerned. Nothing would do more to enlighten the minds of the community in regard to the purposes and practices of the labor leaders than an open contest with the public authority, and neither Mr. Roosevelt nor the public is likely to be much alarmed at the threat of political attacks.

THE death of Professor Corfield removes a conspicuous figure in the field of sanitary science. Although not, perhaps, the most judicious among English sanitarians, he was one of the most earnest, and did a great deal of good by his enthusiastic advocacy of cleanliness at a time when the public had very little conception of hygienic living. He was, moreover, a man of great and varied scientific attainments as well as a specialist in hygiene. Receiving his mental equipment at Oxford, and, subsequently, at University College, in London, and in the medical schools of Paris and Lyons, he was, when a very young man, appointed Examiner for Honors in the Natural Science School at Oxford, and, not long afterwards, was made Professor of Hygiene in University College, London, the chair having been established expressly that he might fill it. In connection with his duties as Professor, he founded at University College a hygienic laboratory, perhaps the first in the world, and carried on many important investigations. His studies of water-supply alone would be sufficient to make him famous; and he was perhaps the first man of science to maintain, and to demonstrate scientifically, the theory of the spread of typhoid fever by means of germs diffused in water, in opposition to the received hypothesis of its spontaneous generation. For all these labors the world owes him a debt of gratitude, the magnitude of which can be best realized by those who are able to compare the condition of

public knowledge, forty years ago, in regard to drainage, air and water-supply, with the present universal enlightenment on such subjects.

THE architects of Orange, New Jersey, have formed an association, to be known as the Architects' Club, which proposes to devote itself to the cultivation of professional ethics and professional interests. The code of ethics adopted by the Club is the same as that current in professional societies generally, with an addition, requiring members "to help all juniors, draughtsmen and students." The once beautiful villages of Orange have now grown and united into a large and beautiful city, with such highly-developed communication that it should be comparatively easy to carry on a friendly association of this sort, and, judging from our own experience of Orange society, we are sure that it will be a very pleasant one.

AS we have already mentioned, the Sixth International Congress of Architects, instead of being held in St. Louis, as the American members of the profession hoped might be the case, will take place in Madrid, Spain, from the sixth to the thirteenth of April, 1904. The usual programme of discussions and excursions is offered, the Congress terminating with a farewell banquet. Political and religious discussions are absolutely prohibited, and the conclusions of the papers or discussions are required to be expressed in French, so that members unfamiliar with Spanish will be able to understand at least the substance of the decisions of the Congress. Papers to be submitted to the Congress should be in the hands of the Secretary, either complete or in an abstract, by September 30, at latest. Further information, in anticipation of the publication of the detailed programme, may be obtained by addressing the Secretary of the Executive Commission, at the Académia de Bellas Artes de San Fernando, Alcala, 11, Madrid, Spain.

IT is quite time that something should be done to reform the methods of the teamsters and expressmen charged with delivering building-materials, baggage and other goods. Many of these gentlemen seem to consider themselves legalized robbers, and to view the fact that some one has entrusted them with property as a simple opportunity for extortion. Every day these worthies bring valuable merchandise, the delivery of which has been paid for, to houses or other buildings, and refuse to give it up unless they are paid an additional sum; and, unless their demands are complied with, they cart it off again, to its serious damage, and retain it, often without the knowledge of the owner, until some one misses it, and submits to their extortions rather than abandon it altogether; or, as an alternative, throw it into the street, where it is left, exposed to the weather and to theft. It might be well for people who find this practice profitable to remember that it approaches dangerously near larceny to carry off goods entrusted to a teamster, on pretext of non-payment of demands made upon some one not a party to the contract of transportation; and the arrest and sentence of a few of the teamsters guilty of it, with civil actions against those responsible for their performances, would have a very wholesome effect. Some years ago, if we remember rightly, the expressmen in New York adopted a habit of leaving trunks on the sidewalk, or in some other place convenient to them, instead of delivering them where they belonged, and the matter was brought to the attention of the courts, which administered an effective correction; and the lesson apparently needs to be repeated in other places.

ARCHITECTS, to whom expenses for expressage often form a matter for serious consideration, might, perhaps, with advantage agitate among themselves for a revival of the movement for the establishment of a parcel-post in the United States, similar to that maintained in every other civilized country. Several years ago the subject was discussed, and the Postmaster-General even prepared a plan for a United States parcel post; but, as he naïvely confessed in his annual report, the express companies made such opposition to the scheme that he was obliged to abandon it. There is very little probability that the express companies will favor the establishment of a parcel-post, which would interfere quite materially with the enormous profits of their business; but the people who are not stockholders in the great combination of express companies have, perhaps, a right to be considered, and the recent advance in express rates, which, in many cases, have been doubled, should make still more urgent the appeal for relief. Very few people in this country have any idea of the cheapness with which articles are transported in Europe. We have sent a large box from Paris to Liverpool, a distance of about five hundred miles, for twenty cents. The charges in this country would have been at least a dollar and a half. In the German cities, multitudes of people have their butter, eggs, fresh fish and other provisions sent to them by parcel-post from the country every morning, at a cost of a few cents for a day's supplies. Even in this country, which maintains, by treaty, a parcel-post with a few foreign countries, a package of reasonable weight can be sent from New York to the interior of New Zealand for less than the express charge to Boston. Unfortunately, there is no domestic provision of the sort, and the unfortunate citizens of the United States are practically delivered over, bound hand and foot, to the express monopoly. We have heard a great deal of late about the hostility of both political parties to trusts. We are ourselves inclined to the opinion that most of the trusts are their own worst enemies, and that they might with advantage be let alone, except where they interfere with the liberty of other people; but the express monopoly is, to a serious extent, a hindrance to civilization, and a check to the free internal commerce which is, for us, a political necessity. It may have served a useful purpose in its time, but it has grown very rich in doing so, and would have no reason to complain if the transportation of parcels should be assimilated in this country, as it is in nearly all others, to that of the transportation of letters. The express companies are, undoubtedly, quite aware of the probability that a demand for parcel-post will be made sooner or later, and some of the transactions which have taken place, or have been proposed, in the postal service have a curious air of having been calculated to postpone the demand. The second-class-matter regulations, for example, while they are of no advantage whatever to citizens generally, absorb uselessly several million dollars a year, which might be used in establishing a parcel-post, and would probably, in obedience to the wishes of the public, be so used if they were available. In the same way, the periodical agitation for the reduction of postage on letters to one cent, which no one really desires, would, by creating a deficit in the postal revenues, prevent the establishment of a parcel-post service, which would be of material value to every citizen, in reducing the cost of what he buys, and facilitating the sale of what he produces.

A COMPANY has been formed in Pennsylvania for the manufacture of slag cement, and a factory will soon be in operation. It is hardly necessary to say that the manufacture of cement from iron slag, the composition of which closely resembles that of Portland cement, is by no means a new thing, but, so far as we know, no slag cement yet produced is equal in quality and uniformity to good Portland cement. We hope that the product of the International Cement Company, which works under patents of Dr. Otto Wirth, of Philadelphia, may be so far superior to the ordinary slag cement as to meet an extended sale, as a cheap and good cement would be a great blessing to this country, and the efficient utilization of waste products is one of the most important departments of industry. According to the newspapers, the process of the International Company consists principally in the removal of the sulphur. As we understand slag cement, while it is probably desirable to remove sulphur, it is still more important to have the composition of the cement uniform, and this point presents the principal difficulty. Naturally, the ironstone used for producing the crude iron varies in composition, and it is mixed, rather roughly, with limestone, also of varying composition, before it is put into the blast-furnaces. During the process of smelting, the silica and alumina of the ironstone combine with the lime of the flux to form the fusible, glass-like material known as the slag, which floats above the melted iron reduced from the ore. While it would be, of course, possible to analyze the ironstone and the limestone, so as to have the slag of uniform composition, it is a serious question whether the ironmasters will be disposed to do this, and, unless something of the kind is done it is very unlikely that the cement made from the slag will be so even and reliable as engineers and architects require. The first cement is to be made from the slag of the Jones & Laughlin Steel Company, which has a high reputation for scientific enterprise, and, if any ironmasters are likely to try to control the composition of their slag, as a valuable product, this Company might be expected to do so.

THE PRIX DE ROME: A PUBLIC PLACE.

IT is a prevalent idea, even among those possibly competent to know, that the Grand Prix de Rome is a prize given and awarded by the École Nationale des Beaux-Arts. As a matter-of-fact it is neither of these. The prize is a State institution and is awarded by the French Academy. The competition is, however, held, so to speak, under the auspices of the École. The competitors may or may not be pupils of the school. To be eligible there are only three real essentials: Frenchmen, single, and under thirty years of age. Nevertheless each competitor whose attainments are unknown, coming perhaps from some obscure town in the provinces, must be furnished with a letter from some competent person stating the qualifications of the candidate. This is merely a preventive measure to insure good faith in the competition, and a necessary restriction on some venturesome spirits hardly cognizant of Vignola, but ever ready for higher flights.

The competition therefore is, as is typical of all French competitions, open to all, and hence the number present for the first trial very large. The selection proceeds by elimination and through three successive competitions, all of which are held at the École des Beaux-Arts. Often more than 300 applicants are present for the first trial. The sketch is of twelve hours' duration and in the nature of an elementary problem, requiring, however, a complete solution in plan, section and elevation. The best thirty are selected to enter the second competition. To these are added thirty others (the privileged of the École des Beaux-Arts), who by a certain number of medals won in the school's competitions are entitled to go in for the second trial without undergoing the first. The sixty men thus chosen compete during twenty-four consecutive hours on a problem of plan that involves a knowledge of composition of the first order.

It is from these that the final ten destined to fight for the Grand Prix are picked. But these ten, called logists (because all their finished drawings are required to be made by each man alone *en loge*) must again make a four-day sketch, showing what is his conception of the problem, a sketch to which he must adhere during the ensuing four months.

The programme of this supreme test generally involves the composition of a group as well as the study of detail. Invariably the most expressive and characteristic solution of the problem wins. Two awards other than the Grand Prix are made, classed respectively as First-Second Prize and Second-Second Prize.

The winner of the Grand Prix receives, during a period of four years a regular pension from the French Academy and while in Rome has quarters in the Villa Medici. The other two logists classed receive stated amounts of money.

It is, perhaps, unnecessary to recall here the struggle of a number of years ago when such a violent series of attacks were made against the methods of the school and the Academy, no longer considered modern and abreast of the times. Curiously enough a man who was not of his time and an architect whose work was non-creative (Viollet-le-Duc) was foremost among those seeking to abolish an institution dating from the time of Colbert.

However it is interesting to note that that strong spirit of antagonism is practically dead to-day and the custom upheld for more than two centuries continues. Moreover, the Grand Prix de Rome men on their return do not live in the dreams of ancient Greece and Rome. Their work expresses the country, the people and the times. The Palais de Justice, the Opéra, the Sorbonne, the art palaces of the Champs Elysées, the Gare d'Orléans and many others are the work of former pensionaries of the Academy, and are all distinctly French — nineteenth and twentieth century French. The inspiration drawn from the Classic masters is moulded and tempered with French thought, as was no doubt the Egyptian art in the hands of the Greeks. The nation's intellectual vigor is too strong to allow a pale, weak reflection of the past, and the great French architects leave archæology to the savants. It is the valiant spirit of inventive style that has given France her position in the art world — just the sense of proportion, a knowledge of the real conditions and the supreme art of expression. The pensionaries at the Villa Medici are offered many facilities by the Government and a vast field of the richest inspiration. What a meagre result, absolutely negative in art, if such a condition of things could at best breed faithful archæologists.

The programme of this year may receive particular attention with us just at this time, when in so many cities commissions have been at work on plans for municipal improvements. We have become alive to the fact that apart from the home and the comfort of the individual life there is the town, the home of a great collective life. The Anglo-Saxon mind has never really seemed to appreciate this. There is little life in the streets in either England or America. People are going or coming, they are not *being* anywhere, unless within four walls. And why? Most probably because the streets are unattractive, the vistas cramped or mediocre and the comforts *nil*. Where there is variety, unconsciously we loiter to observe, and unquestionably the monotony of the checker-board-planned town hurries both citizen and stranger on their way. The great secret of the charm of many European cities for us is the relief we experience in not being constantly face to face with the enslaving *terre à terre*. We are at one time perhaps in some tortuous and narrow street with every object foreshortened, while a few moments later, in a public square, great vistas reach out through streets and avenues, and a constant series of varying perspectives charm the attention.

In a city it is felt that broad avenues, handsome squares and gardens are not alone necessary. The architectural accent has a great rôle to play, and it was the placing and enunciation of this accent that constituted the difficulty of the Grand Prix problem.

The Grand Prix this year was awarded M. Jossely, a pupil of Daumet et Esquié, largely on the merits of the plan, the first consideration of all composition; and also, no doubt, for a great sincerity of expression.

The great place, firmly silhouetted, is admirably framed by the architecture and most skilfully cut by the avenues and streets. It is left free and unobstructed to circulation. The accessories, such as fountains, lamps, approaches, commemorative monuments, etc., are thrown to each side in proximity to the architectural groups. A certain amount of gardening, a few shelters and porticos and some statuary complete the *ensemble* and add a life and interest in harmony with the programme.

The buildings are in themselves well detailed, the scale being well sustained in each and in one with the others, and the balance nicely preserved in spite of a somewhat non-symmetrical premise. In fact the data for the military club and art club are not the same and the designer has ably differentiated in plan while giving his façades an apparent similarity necessary to a great and simple monumental effect. The architectural expression of Stock Exchange and clubs is excellent. In both clubs the "reception" floor is one flight up, hence the basement treatment of the *rez de chaussée*, while the Bourse has its great board-room on the first floor, and so the monumental portico of the façade springs from that level. All these buildings are well accused, the scale of their parts being in good relation to the interiors, and the elevations seem an ample and simple expression of the plans. Some exception might be taken to the introduction of the arch on either side of the lintel colonnade of the Bourse. It is disturbing and breaks the unity of the design, but this seems to be the only criticism of any consequence. The accessories are all charmingly studied. Their excellent disposition and scale add much to the value of the composition and, while serving to tie the units into a whole, add a singular atmosphere of reality.

The Second Prize is less successful from every point-of-view and, while there is some skill shown in the main outlines of the place, the general effect is dry, hard and unimaginative. There is a bad relation between voids and solids. The Bourse is particularly lost in its surrounding avenues. It seems small and insignificant. Moreover in itself it is signally defective. The mass of the board-room and surrounding corridors and offices is insufficiently attached to the portico of the façade which runs on uninterrupted. This portico, considered apart, is excellent in itself, but the great dome above is quite unattached to it; rather cold and of a different architecture. The side elevation, too, is equally faulty. The dome overpowers all, and the end termination of the portico is of a most exaggerated character. Neither is there anything on the other end of the long side to hold down the lavish triumphal note of this end termination. The scale goes to pieces on this side elevation. There is a bad relation between the parts, but the parts in themselves are well handled. The proportions of void and solid are excellent and all the detail good, and there is often a fine architectural sense. It is in the *ensemble* that each building is faulty and the same error of proportion is found in the entire conception of the place, which is badly obstructed with accessories and stiffly and monotonously cut by the streets. The designer has attempted no distinction between the club buildings and the direct symmetry prevails throughout the composition both in plan and elevation. Yet this criticism must not be taken as though the work was devoid of merit, for that would be far from my intention. The impression conveyed by different parts is excellent, often of the best, but the design has failed through a want of understanding of the programme. It is not realized along the lines intended, and while scholarly in some respects wants that air of reality so firmly marked in the Grand Prix. M. Wielherski's work is made "*par morceaux*." *Ce n'est pas encore de la grande architecture*, but with his talent and energy success may not be refused him another year.

We are told that the drawings of all the logists were excellent and that the competition as a whole was remarkably strong. The result was somewhat discounted from the first. M. Jossely has won many honors at the École des Beaux-Arts and well deserves the crowning laurels that go with the highest of them all, *Le Grand Prix d'Architecture de l'Académie des Beaux-Arts*.

THEODORE WELLS PIETSCH.

ARMED CONCRETE LATTICE-GIRDERS.

SINCE the advantages of the so-called armed concrete constructions have become known, numerous attempts have been made to secure maximum efficiency with a minimum expenditure of material and at a minimum cost of manufacture. A Zurich architect, Mr. Franz Visintini, has succeeded in designing armed concrete framework girders for building purposes which combine all the above-mentioned advantages.

As is well known, the advantages of a framework girder are due to the favorable distribution of stresses which all act in the central plane of the members, and also to the fact that framework girders require less material than solid ones, and are therefore considerably lighter. Visintini built up proper framework girders of concrete, reinforced with iron bars; the members subject to compression only

being made of concrete alone, while those always, or only with a certain distribution of load, subject to tension are made of concrete with iron core. In upper and lower flanges or booms these cores are constituted by cylindrical rods to which the iron cores of the struts are connected simply by bending their ends round the cores of the flanges or booms. No sliding of the iron cores of the struts on those

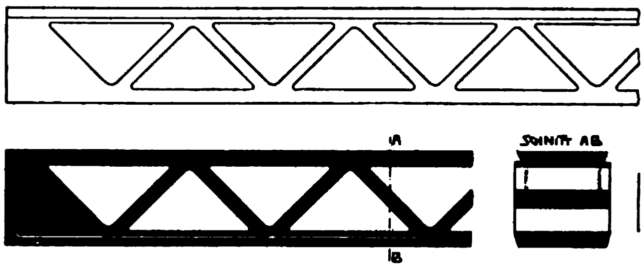

Fig 1. Elevation, longitudinal and cross-section.

of the upper and lower flanges can take place, owing to the presence of the body of concrete enclosing them, so that concrete in this case replaces riveting.

As far as carrying capacity is concerned, there would be no necessity to provide members of compression booms with iron cores, but it is preferable to do so, as this affords the simplest connection between struts and flanges.

In the first place, the inventor intends to apply his system of girders to building construction, and he designed various girders, beams and other parts used for building purposes, in such manner that they can be manufactured away from the building yard. This is a great advantage, as hitherto it was absolutely necessary to build up armed concrete girders *in situ*. In this way, building operations are no longer delayed by the work of applying concrete, and the building yard no longer obstructed by centering and other boarding which was required hitherto. Visintini's armed-concrete girders are cast in moulds to which the iron cores are secured. The illustrations below show girders manufactured in this way, and intended to be

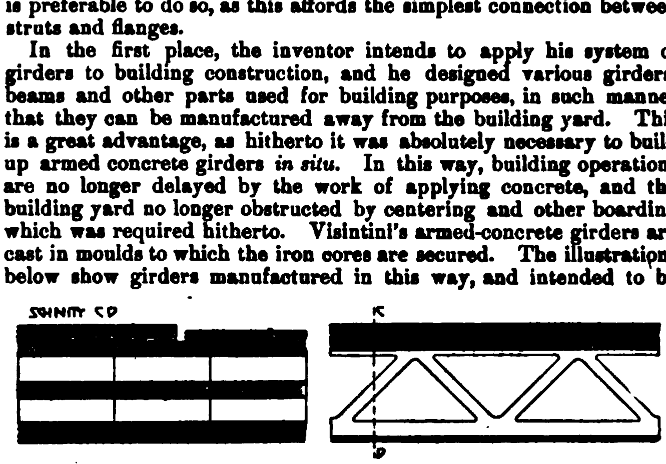

Fig. 2. Construction of the Floor on a completed Ceiling.

used as wall-plates, girders, beams, etc., for floors, roofs, staircases, etc.

When used for making floors, armed concrete girders are laid side by side, and the recesses filled with concrete. In order to prevent single girders from bending, which would cause cracks in the plastering, the floor is made one whole in the following manner: —

The upper flanges of each girder or beam are provided on both sides with longitudinal recesses of such shape as to produce, when two girders are placed side by side, a dove-tail groove. Small pieces of iron are placed in this groove which thereupon is filled with mortar, and in this way ample security is obtained against longitudinal cracks in the ceiling.

Numerous tests as to the carrying capacity of such floors, made by the inventor, and in some larger cities in Europe, have given highly satisfactory results.

In case of cellars, larders, etc., where the ceiling is not plastered,

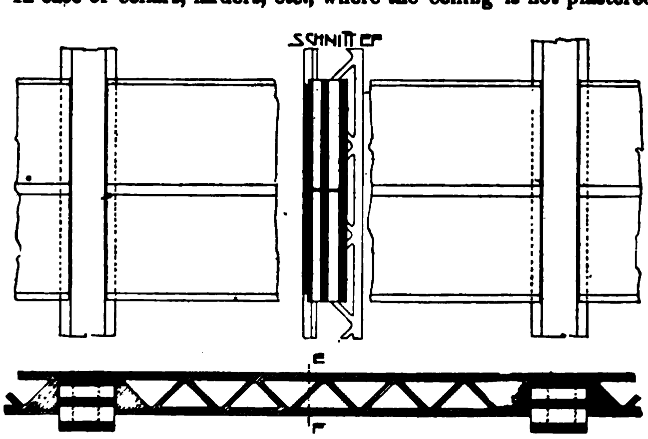

Fig. 3. Wall plates and filling girders.

the separate girders need not be connected together, and it may be confidently expected that, as in other armed concrete structures which are generally distinguished by great rigidity, there will be very little bending. Figure 2 shows how the various kinds of flooring are to be secured to the finished support.

For laying a boarded floor, small wood blocks are placed in the dove-tail grooves above referred to, before the mortar has set, the first set of boards being nailed to the said blocks and forming a support for receiving flooring boards. The illustration shows clearly the method of laying a floor of tiles.

The spaces between the upper and the lower flanges and the struts

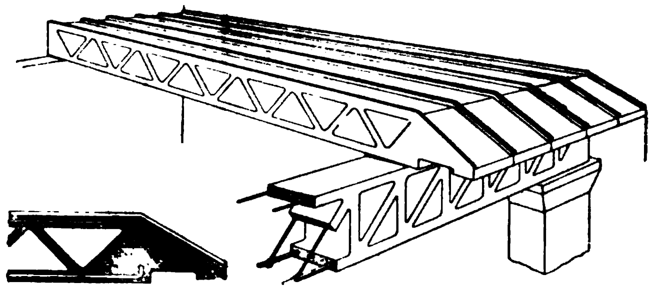

Fig. 4. Terrace Girders.

of the girders form, in a completed ceiling, passages (of triangular cross-section) running transversely of the girders. These hollow spaces or passages containing air, prevent transmission of heat and cold and of sound through the ceiling.

Another advantage of this construction is that passages immediately adjoining the upper flanges, can be utilized as flues for heating the floor, thus obviating the drawback of having cold floors.

Another construction of floors with armed concrete girders consists in arranging them at certain uniform intervals apart and bridging over the intervals with auxiliary girders (also armed concrete lattice-girders), as shown in Figure 3.

When armed concrete girders are to be used for making terrace, or flat, roofs, they are provided at one end with a drip and connected to form a roof in the way described, the roof being given a gentle slope in the longitudinal direction of the girders and rendered impermeable to water by means of a layer of asphalt. These girders afford a splendid material for construction of terraces or flat roofs, which is less affected by weather than any other material. Figure 4 shows such a construction and at the same time illustrates the use of armed concrete girders as wall-plates.

Armed concrete girders can also be used, singly as columns, or connected together to form a wall. These walls would also possess hollow passages or flues, to which applies what has been said with reference to the passages in floors. Figure 5 shows clearly how openings for windows and doors are to be made in such walls.

In building staircases, the chief consideration, besides sufficient strength, is that they should be fireproof. Unfortunately many so-called fireproof staircases are in reality by no means so. An example of it is the favorite hanging-staircase, consisting of steps let in at one end into the wall. A recent fire in Vienna has clearly shown that this construction is by no means fireproof, as the staircase collapsed a few minutes after the fire reached the stair-well. Stone cracks under the influence of heat. The case is, however, different with structures of armed concrete. They have been proved to be thoroughly fireproof in the most conclusive manner by numerous experiments. Moreover, a staircase built of armed concrete is exceedingly light and elegant, as shown by the staircases actually constructed. Hitherto, however, the building of such staircases was not simple enough to induce architects to adopt them on a large scale. It is a point in favor of the new construction of staircases that the parts arrive at the building yard all complete, so that it is a comparatively simple matter to put them together. The inventor

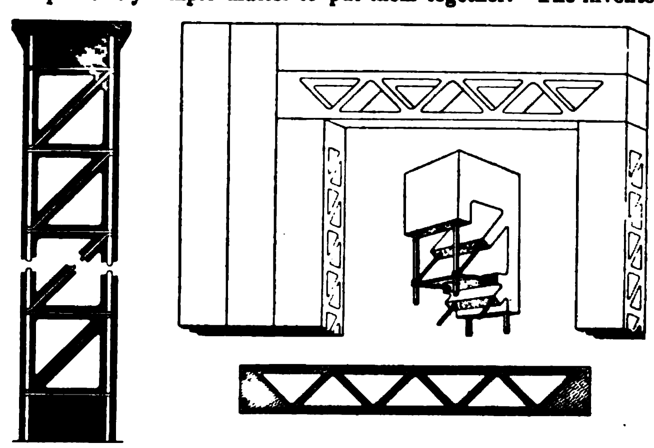

Fig. 5. Columns and their use.

has succeeded in designing armed concrete girders that combine all the above advantages.

A staircase built of armed concrete is clearly illustrated in Figure 6. The riser is constituted by an armed concrete girder with a tread connected to the lower flange. The girder may be either supported at two points or by a cantilever, according as it is desired to have

a supported or a hanging staircase. The illustration shows steps of a hanging staircase. The girder being a cantilever, is made fairly stout, but it could be made considerably lighter for supported staircases when it rests on two brackets. The illustration shows more clearly than any description could, the method of securing the tread to the girder constituting the riser, the iron cores of the said tread being in one piece with those of the vertical members of the girder. This simple method of connecting the steps together is very advantageous, especially as it compensates for any small irregularities in the manufacture or in erecting; this advantage is of special importance for the so-called geometrical stairs. The treads of the finished staircase are laid with some covering, and their front edges provided with a special ledge to prevent wear.

In hanging steps, the iron cores of the flanges can be extended to project beyond the free end of the steps, and utilized for securing the balustrade.

Although a staircase built of separate steps is not quite so light as one of iron and concrete which is made in place from beginning to end and the arms of which are then also in one piece, our construction combines the advantages of stone staircases with that of being perfectly fireproof; it is at the same time more reliable than a stone staircase, as the small tensile strength of the stone is here replaced by the great tensile strength of the iron cores.

The Visintini armed concrete girders possess, besides, the advantages inherent to all armed concrete girders, viz, they are fireproof, rigid, and not liable to vibrations. In order, finally, to help the reader to draw a definite conclusion, an extract from the opinion of the well-known expert, Prof. Fritz von Emperger, may be given here.

Prof. von Emperger refers first to the question of organization of building operations and says: —

"The organization of building operations obtaining at the present time, pre-supposes that all essential parts of the building, vertical

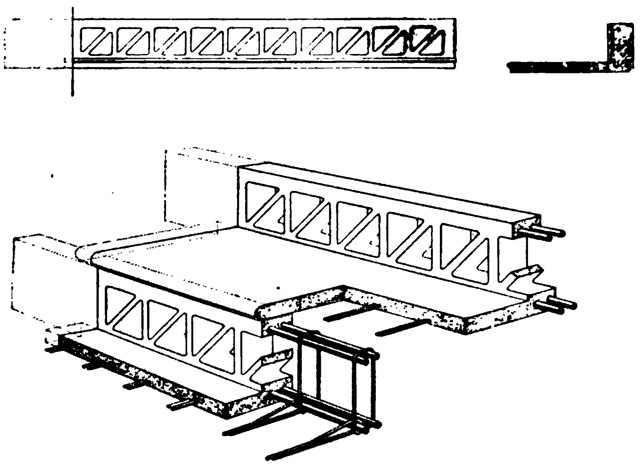

Fig. 6. Staircase steps.

walls excepted, have been made outside and delivered to the building yard." This organization has led to the invention of several systems of building in concrete and iron which enable most parts to be supplied to the building yard in a more or less complete state. It may be interesting to quote here the salient points of the opinion, relating to such systems. It says as follows: —

"With reference to the above mentioned systems, the following may be said as a general proposition: —

(*a*) With reference to the general organization of building operations, already touched upon: —

1. It is possible to test the parts delivered as to their quality and carrying capacity.

2. When the necessary level is reached, the floor can be quickly made with the parts delivered, without the work of erecting the walls being interrupted.

3. Owing to the parts being supplied in a perfectly dry state, the floors can be used at once and without any scaffolding, and the work of the interior fitting proceeded with.

(*b*) With reference to the manufacture in a separate work.

4. The parts are always manufactured in the said works by experienced staff and under expert supervision.

5. By keeping concrete moist for a desired length of time, it can be given the properties which it never acquires when applied during the building, since it is impossible to keep it moist without rendering the building damp, and since it is exposed to draughts and heat during the time of getting hard. This is of the greatest importance for the adhesion and efficient use of the iron.

6. The girders are protected from injurious consequences of the settling of walls and of the premature removal of the boarding or centering, etc., which are particularly dangerous in case of recently made concrete.

7. The sand and gravel used are carefully chosen on the ground of long experience and from the kinds well known to the works.

8. The same applies to the cement and to the proportions in which it is used, as well as to the testing of the necessary samples."

With reference to the Visintini system here discussed the following advantages are mentioned in the opinion in question: —

From the point-of-view of the architect: —

1. The air-flues produced by it in the floors can be utilized as heating flues or as conduits for laying pipes and wires, without the walls, or the decorations on them, being destroyed.

2. Prevention of cracks in the ceiling decoration.

3. Simplicity of renewal of damaged parts and facility of building annexes or extensions or making subsequent alterations.

With reference to the cheapness of manufacture: —

4. Great simplicity of the mould, therefore small expenditure for installing a factory.

5. Possibility for installing the factory in proximity to the building yard, for the purpose of reducing the cost of carriage.

6. Convenience of handling in erecting.

7. The smallness of the quantity of mortar required for connecting Visintini armed concrete girders in such a way as to ensure their acting as one structure.—*Beton und Eisen.*

THE BEGINNINGS OF CHICAGO.[1]

THE city of Chicago owes its existence primarily to the river bearing that name and to the fact that the river empties into the head of the most southwesterly of the Great Lakes. The history of this city, because it is situated at the mouth of one waterway and the head of another, is similar to that of other inland cities. The waterways were the ready-made highways of the interior. Up and down them passed the explorer, the missionary, the trapper, the trader and the pioneer farmer, tracing the way for future lines of commerce. At various obstructions along these ways, perhaps the head or mouth of a river, a portage, or a natural harbor, the products of adjacent regions were collected, to be forwarded in bulk to the Atlantic seaboard. The manufactures, which were sent in return, came to these inland points for distribution. Thus what had been in turn a camping-ground for the Indian, a halting-place for the explorer, a post for the trader, and a rendezvous for the pioneer, became a commercial centre which grew to a city. The mouth of the Chicago River was marked by nature to serve such a purpose.

Extending in a crescent sweep about the head of Lake Michigan is a low flat plain not over fifteen miles wide, reaching from Winnetka on the north through La Grange on the west to Dyer, Ind., on the south. Its concave side is occupied by Lake Michigan and its convex side is bounded by the great Valparaiso moraine. It was formed by the melting and retreat of the great ice cap which came down from the north in the Ice Age. At one stage the water was dammed up by the moraine, creating what is known to geologists as "Lake Chicago." At the bottom was deposited a flat plain of sand and clay which became dry land after the water had retreated to its present position to become Lake Michigan. The northern part of the plain is drained by the Chicago River and its two branches, one coming from a northern and the other from a southwestern direction.

So flat is the Chicago plain that the south branch of the river rises less than twelve miles from the mouth. Beyond the head of this branch is the outlet through which the pre-historic "Lake Chicago" was drained into the Desplaines River. The summit of this divide, between the drainage basin of the Great Lakes and that of the Mississippi Valley, is the old Chicago portage, unknown and unimportant in this railway age. Here the land is only 15 feet above the level of Lake Michigan. If the lake level had been 16 feet higher, it would have drained into the Mississippi. The slight elevation of the watershed suggested the possibility of the present Drainage Canal.

Upon the plain described above, the city of Chicago has been built. The ground is made up of bowlders, sand and clay, a mixture commonly known as "glacial drift." The excavation for a building in any part of the city will show the unstable character of the soil. Beneath it at varying depths lies the solid Niagara limestone which may be seen in the stone quarries in many localities just outside the limits of the plain. The bedrock is not level but has many undulations which cause the varying depths shown by borings in different parts of the city. The deepest point yet found is about one-half mile north of the junction of the two branches where the bedrock lies 124 feet below the level of Lake Michigan. The average depth is estimated to be about 50 feet. Because of the instability of the soil, few localities could have been found more unsuitable for building a city. But the demands of commerce have slight regard for topography or for good building sites. The most recent method employed by builders to overcome the inherent difficulties of the unstable plain is to sink caissons to the bedrock and fill them with concrete. We can thus imagine our great buildings standing upon gigantic stilts which rest upon the bedrock far beneath.

In such a soil and on such level ground, the river would naturally flow sluggishly and would cut a deep channel, carrying the washings to be deposited in a bar at the mouth. It would in this way form a natural harbor for lake commerce, extending two or three miles inland. However, the history of Chicago dates back to a time when a harbor for vessels of large burden was not

[1] A lecture by Edwin Erle Sparks, Ph. D., delivered before the Western Society of Engineers, May 2, 1903, and printed in the *Journal* of that Society.

dreamed of. It began during the days of the French missionaries, when the utility of a river as a highway was the important consideration, especially if there was only a short portage from its head to a stream flowing in the opposite direction. The Chicago River was almost ideal in this respect, since it led by its south branch to the Chicago portage and thence into the Desplaines and the Illinois, being the connecting link between the Great Lakes and the Mississippi. Like all rivers in level countries, the sluggish waters of both streams allowed navigation far up toward the portage, especially in the rainy and melting seasons. It was possible, according to the accounts of the early explorers, to take a boat at certain times of the year over the Chicago portage without unloading it.

The French explorers and the Jesuit missionaries at first reached the Mississippi by Green Bay and the Wisconsin River. But they soon learned in returning to come up the Illinois to the Kankakee and thence to cross the portage to the St. Joseph River, now in Michigan, which empties into the southeast bend of Lake Michigan. At a later time they found the still shorter way by the Chicago River and portage. No satisfactory evidence has been left to show when this route was first used. Marquette and Joliet may have passed this way on their return journey from the Illinois Indians to the mission at Green Bay in 1683. La Salle and Tonty used the Chicago route before 1680. La Salle spent a part of the winter in 1682 in the first house built by white men at the portage. The following year he headed a report: "Du Portage de Checagou, 4 Juin, 1683." When the easy route by the "Garlic River," as the stream was sometimes called because of the foul smelling wild plant growing on its banks, became fully known, it was one of the principal thoroughfares of the French during their prolonged journeys through the Illinois country.

Permanent French settlement, however, approached Illinois not by the Chicago portage, which the Jesuits and explorers had used, but came up the Mississippi after the founding of New Orleans. The French villages of Kaskaskia, Cahokia, and others which were founded in Illinois, soon fell into decay because of the advance of the conquering English and Americans. Even the stronghold of Fort Chartres, built to protect these villages, was torn down by the invaders to obtain building stone. Only the ruins of a powder-magazine remain to show where the fort once stood.

After the French had been driven out of the Mississippi Valley, the Chicago portage lay in obscurity for nearly forty years, until the onward march of the American people across the continent brought waterways and portages again into prominence. It was the policy of the United States Government to plant forts along the front line of people to protect them and to increase the sales of the public lands. These forts were erected on the highways of commerce where protection was most needed. Among the sites occupied in the middle West may be named the point where the French Fort Duquesne and the English Fort Pitt once stood, now occupied by the city of Pittsburgh; Fort McIntosh, where Beaver, Pa., now stands; Fort Harmer, at the mouth of the Muskingum; Fort Washington, at the mouth of the Miami, near which Cincinnati, Ohio, is now located; Fort Industry, at the mouth of the Maumee, about which Toledo, Ohio, grew; Fort Renault, now Detroit; Fort Wayne, still bearing the name, and Fort Mackinac, which is now surrounded by Mackinaw City.

As the people advanced, the Government was accustomed to quiet the Indian claims to the land by making treaties with the savages. By the treaty of Greenville in 1795, a line was drawn from east to west across what is now the State of Ohio and thence south to the Ohio River. Beyond this line the whites agreed not to make settlements, and the Indians agreed not to molest any one living east of it. An exception was made to the first part of the bargain by the Indians giving to the United States certain reservations at important points where forts could be erected to protect traders. Among the sixteen reservations provided for by the treaty of Greenville was one for "a space six miles square at the mouth of the Chicago River where a fort formerly stood." This reference to a fort was no doubt to the traditional French fort erected in 1685 as an outpost to Fort St. Louis. It was probably nothing more than a barricaded hut.

By 1803, trade had increased along Lake Michigan to such an extent that the erection of a fort at some point on its shore was felt to be imperative. It is said that the mouth of the St. Joseph River was first contemplated; but there was no reservation at that point as demonstrated on the map made by Morse in 1796. Hence, Secretary of War Dearborn chose the reservation at the mouth of the Chicago River as a proper site. Fort Renault, at Detroit, had long been garrisoned by several companies of the First Infantry. One of these was selected to proceed to the Chicago River and to erect the proposed fort. Captain John Whistler, with some of his officers and the women, came around the lakes by boat to the mouth of the St. Joseph and thence crossed the lake by row-boat to the river. Lieutenant Swearingen marched the men by way of Fort Wayne.

One may faintly imagine the appearance of the mouth of the river when these troops arrived in August, 1803. Scrub oaks dotted the sandy shores, replaced by trees of a larger growth out toward the fertile prairies on the westward. The river flowed sluggish and silent between low-lying, sedgy banks. Evidences of Indian encampments and huts of traders could be seen on all sides. Indeed, the soldiers found a French trader, Le Mai, living in a small cabin near the mouth of the river. Near by dwelt Ouilmette (Wilmette), a half-breed Indian. Before the snows of winter covered the drifting sands, the soldiers and artificers had constructed two blockhouses, quarters for the officers and barracks for the privates, and had surrounded the whole by a high connecting stockade with a second lower palisade outside. A subway was dug through the sand to the river to supply the fort with water in case of a siege. Near the fort was built the log house or "factory," as such adjuncts to forts were called, where the Government trader exchanged his stores for skins brought in by the savages and private traders.

Not only were the general surroundings of the mouth of the river different from those of the present day. The river itself has been so changed in its course that a map is necessary to show it as the troops found it. A sand-bar had accumulated across the mouth, possibly caused by that mysterious current in Lake Michigan which deposits bars on the north side of obstructions on the west shore. The bar had pushed the mouth as far south as the Madison Street of the present city. This is well illustrated on a Government map issued when the first proposition to convert the river into a harbor was being considered by Congress. In the bend of the stream the fort was located. The drifting sand had made a kind of hillock or high ground at this point.

Between 1803 and 1812, the history of Fort Dearborn, as the fort gradually became known, through compliment to the Secretary of War who established it, is almost a blank. There was always one company stationed here, but it must have been a dreary and monotonous life on the sands along the shore. From time to time, the "factor" made his report to the Government, showing a prosperous trade. A few houses were built near the fort, that of Mr. Kinzie, just across the river, being the most prominent. The poplar trees in front of his house figure in all early sketches of Fort Dearborn, looking northward.

The year 1812 found the entire Northwest alarmed over the Indian rising under Tecumseh. Burning cabins and scalped settlers warned the whites to fly to the nearest fort. Even the safety of Fort Dearborn was questioned, lying so far in the Indian country. Orders were given to the commandant to evacuate and retreat to Fort Wayne if he deemed it best to do so. Attempting to carry out these orders, the body of troops and settlers was attacked by the Indians near the present foot of Eighteenth Street. Twenty-six of the fifty-four regulars were killed, together with twelve militiamen, two women and twelve children. Five more regulars, it is said, were put to death after surrender. The prisoners were then distributed among the various tribes for service. Eventually nearly all were ransomed or made their escape. For many years a tree known as the "massacre tree" stood near the lake and presumably near the scene of the attack on the women in the wagons. It has been replaced by a spirited group in bronze representing the rescue of Mrs. Helm by a friendly Indian, Black Partridge.

At the close of the War of 1812, the fort was rebuilt on the same site, but of different design. One blockhouse was now felt to be sufficient. Settlers and traders gradually reoccupied their old quarters. The fearful experience of the massacre was never repeated. So peaceful were the savages that in 1823 the troops were withdrawn from Fort Dearborn to garrison posts farther west. However, in 1828, owing to the uneasiness of the Winnebago Indians, a company of regulars came up from St. Louis to reoccupy the old fort. The commanding officer was annoyed to find that the sand-bar across the mouth of the river prevented him getting his supply boats into a place of safety from the storms on the treacherous lake front. He employed his men in digging a temporary channel through the bar, a prophecy of the later Chicago harbor; but the currents soon filled it up after the troops were withdrawn.

In 1832, the Black Hawk War brought General Scott and a large body of troops to rendezvous at the deserted Fort Dearborn. Once more the attention of Congress was called to the fact that vessels on Lake Michigan could not approach a fort which had been built to protect that body of water. Shipping must lie in the offing and discharge their cargoes by lighters. Various reports from engineers connected with the troops stationed at the fort had called attention to the same obstacle and also to the ease with which the mouth of the river might be converted into a harbor. It needed only two parallel piers out into the lake and dredging between them. No other point in the vicinity offered such possibilities. The value of the property destroyed in one season by the storms on that portion of the lake, it was declared, would go far toward making a harbor. Frequently auctions were held to dispose of the cargo of unlucky vessels caught on the unprotected shore.

Such arguments brought from Congress in 1833 the first appropriation for straightening, deepening and widening the Chicago River and converting it into a magnificent harbor. These appropriations were small at first, aggregating only $486,000 in nearly forty years; but were increased from time to time with the increased demands of trade until they have now passed the $4,000,000 point for the Chicago River and harbor alone. It is interesting to note that almost contemporaneously with the first appropriation, an enterprising trader killed and packed meat for shipment to Detroit instead of sending the cattle and hogs on foot, as had been the practice. About the same time, small elevators began to appear on the banks of the river. Grain was hauled to them in wagons from

the prairies and lifted by rope and bucket to the top of the building, to run through chutes on the other side to the hold of a waiting vessel.

Fort Dearborn, near the mouth of the stream, formed one of the centres of growth of the embryo city; the junction of the two branches, commonly known as "Wolf's Point," became another. A sketch made at the latter place in 1832 shows on the left the Wentworth tavern or trading-house, and, on the right the Miller house, which was also used as tavern and residence. Between them ran a log bridge across the north branch of the river. Only by comparing the scene with a modern photograph taken from the same standpoint is the change in the river and surroundings appreciable. Passing down the main stream to the right, one reaches a point on the bank opposite to that once occupied by the old fort and beholds a similar transformation. Where the rope ferry was once poled across the river, a great bridge now swings noiselessly to allow magnificent vessels to pass to docks beyond. Wharves line the shore where rushes formerly flourished in the swampy margins. The sand between the fort and the river has been dredged away to allow great floating hotels to lie at dock and await the coming of passengers. A large part of the site of the old fort is now under the Chicago River.

The lake traffic, which gave the first impetus to modern Chicago, increased enormously between 1830 and 1870. The appearance of steam vessels and the harbor improvements were largely responsible for this growth. The exact time of the coming of the first steamer is in dispute, although it must have been near 1830. At the end of 1836, it was recorded that 212 vessels had been able to get inside the river. In 1854, there were forty-six vessels plying regularly between Chicago and other ports. In 1871, more than twelve thousand vessels entered and cleared from the Chicago harbor.

About 1830 railways, instead of canals, were advocated in the United States to connect navigable waterways. Few imagined that the railways could ever supplant the canal. A railway from the head of Lake Michigan to the Mississippi or even to the Rock River was for many years a Chicago vision. By 1848, it had been realized to some extent. The problem of conveying lead from the mines at Galena to the lake caused that city to be made the proposed western terminus. The locomotive "Pioneer," now preserved in the Field Columbian Museum, was brought to Chicago by steamer and was put to work on the few miles of strap-iron laid on stringers placed end to end on piling driven into the wet prairie between the Chicago and Desplaines Rivers. This was the Galena & Chicago Union Railway, whose frame passenger-station stood for many years just west of and across the North Branch from the present Northwestern station on Wells Street.

By the middle of the century, the rival railways between Lake Erie and Lake Michigan, the one constructed through "Central" Michigan and the other through "Southern" Michigan, rounded the head of the lake and came into the city simultaneously. The Michigan Central and the Illinois Central came along the lake front on piling driven into the water, which carried them as far north as the foot of the present Randolph Street. Between this piling and the beach, now Michigan Avenue, pleasure boats were sailed and rowed, giving the people of Chicago the use of a lake front which they have not since known. The railroads soon began to fill in the lake front, compelling the public to go beyond them in a park made by artificial means. Michigan Avenue, formerly the beach of the lake, is now far inland, and the mouth of the river at the foot of Madison Street exists only in tradition. Terminal yards and tall buildings occupy that part of the former site of Fort Dearborn which has not been dredged away in straightening the river. The old mouth is now a part of the new Lake Front Park.

After the final evacuation of the fort, the property was put in the care of the engineer in charge of the river improvements. The reservation of six miles square made by the treaty of Greenville was a transaction with the Indians and was distinct from the United States reservation for the fort. The latter, amounting to about seventy-five acres, lay in the shape of a triangle having its apex at the fort. The base-line crossed diagonally from the river near the foot of Dearborn Street to the lake shore near the foot of Madison Street. Under the law of 1819, which gave permission to the Secretary of War to dispose of military sites no longer needed, that official yielded to petitions from the citizens of Chicago and in 1839 divided the reservation into town lots to be sold at auction. Certain portions were reserved for public use. One of these became Dearborn Park and is now occupied by the Chicago Public Library.

The fort reservation will acount for only a small portion of the land occupied by the city of Chicago. The remainder of the site, lying along the river and both branches, was included in the 290,000 acres of land given by the National Government to construct a canal over the Chicago-Desplaines portage. The streets, much as as they are to-day, were laid off at right angles to each other across this proposed town site and the lots were sold at auction in 1830 for the benefit of the canal fund. Certain reservations were made for school purposes as well as a square for a court-house. The latter ground is now occupied by the county and city buildings. At the sale, the lots along the south branch near the junction brought the highest price. The average price of all the lots was about three hundred dollars. The site of the present Sherman House brought forty dollars.

Much of the ill repute of Chicago in early days can be traced to the topography of the city. Water would not drain naturally from the low plain on which it was built. Cellars were almost impossible. Deluded purchasers found their lots under water. Between 1855 and 1860, the grade of the entire city was raised, in some places more than 10 feet. An old painting in the Chicago Historical Society's Building shows the comical appearance presented by the city during this period of elevation. Entire rows of buildings rested temporarily upon blocks and jack-screws. Pavements were on different levels. The conditions of things must have conduced to sobriety since the late return home of the typical club-man would have been an impossibility. The streets were filled to the new level and macadamized, instead of remaining paved with the old warped planks, which bespattered the pedestrian when a vehicle chanced to pass.

About this time, the little court-house, which had done service since 1837 in the public square on the corner of Washington and Clark Streets, was replaced by a two-story stone building, to which was added a third story in due time. A lawn both at the front and back of the building afforded space for public meetings. The leading statesmen of the day graced the rostrum of the old court-house steps.

The beginnings of Chicago may well close with her rebaptism in the fire of 1871. Without this blessing in disguise, it would have taken years to clean out the unsightly buildings due to the growth of the city from a frontier post. The easiest way to be rid of having to wear the clothing which one has outgrown is to burn it. Wooden pavements and frame buildings are stages of development. Chicago was done with both in the business district at one direful stroke. Only those who passed through the experience of the fire know its horrors. Only those who study a map of the "burned district" realize the space which it swept over.

The chief problem the Chicago of to-day must deal with is the river. How to provide for inter-urban movement with water traffic across the principal streets has claimed the attention of engineers and experts. Few other cities face the same problem. Generally the river or harbor is to be found at one side of the city proper, or it is not so long and narrow as the one which penetrates into the very heart of Chicago. How essential the river was to the founding and the growth of the city it has been the endeavor of the foregoing pages to show. Without the river, there never would have been a Chicago. Can the prosperity of the city continue without the free use of the river for commerce? We have tried nearly every conceivable manner of crossing that stream and yet not interfering with traffic. We have crawled under it in tunnels. We have gone around it in belt lines. We have made bridges that turn, that open, that lift, that slide, anything to reconcile land and water traffic.

The history of Chicago falls naturally into three periods. The French occupancy two hundred years ago, interesting though it is, has no real connection with the modern city. The second stage, that of Fort Dearborn and the troops, which covered nearly thirty years, is only remotely connected with the modern commercial centre. Industrial Chicago began with the opening of the harbor in 1833. Yet the building of the fort marked the beginning of continuous government under the United States. The stars and stripes, once raised on the staff near the middle of the fort, have floated over the city to this day. The protecting hand of the United States Government, represented in the troops a century ago, in the land given for digging the old canal, and in the appropriations for the improvement of the harbor, has never been withdrawn. Counting the building of the fort as the real beginning of Chicago, the centennial will occur in 1903, to be appropriately celebrated during the last week in September.

No city in the United States can excel Chicago in the picturesqueness of her past. No city has had such a succession of varied and striking types. Above her busy streets and lofty buildings pass in historic shade the Jesuit, the trapper, the trader, the pioneer, the soldier, the land speculator, the promoter, each contributing his unconscious part to the making of an American city. The canal, which Joliet wished to cut across the Chicago portage but to which La Salle objected because the stage of water would make it serviceable during only a small portion of the year, was realized nearly two centuries later by the Illinois and Michigan Canal. It has now been practically abandoned and superseded by a parallel artificial waterway designed for a ship canal.

That this service will ever be rendered by the Drainage Canal is unlikely because three great transcontinental lines of railways traverse the length of the portage. An electric trolley has been added as if to make a prophecy of the future. Where the Jesuit and his *donnes'* once dragged their sledges by head bands and straps, where the *coureur du bois* tied his bright-colored sash about his embroidered hunting shirt and set afresh his pudding-bag cap before bending to the burden of his boat, giant locomotives now drag mile-long freight-trains or whirl portable hotels over the old Chicago portage.

Some day when all this is materialized on a commemorative column or historic arch, when it stands in enduring pageantry on a memorial bridge, Chicago will mean more to one class of its citizens than

a place to make a fortune and to another than a place of securing daily bread. Civic as well as national pride rests most securely on veneration for the past.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE HIGH SCHOOL, LEXINGTON, MASS. MESSRS. COOPER & BAILEY, ARCHITECTS, BOSTON, MASS.

PLANS OF THE SAME.

THE GRAND PRIX DE ROME: A PUBLIC PLACE. BY M. JAUSSELY.

THE programme for this year's competition is as follows: —

This place is supposed opening on a broad avenue bordering a river.

Commemorative monuments, fountains, porticos, or other decorative motives might contribute, with the façades of important buildings, to the decoration of this place, on which streets and boulevards will abut. A monumental bridge will unite this place to the opposite side of the river.

A stock exchange (Bourse), a military club and an art club are supposed the principal buildings.

In the stock exchange provide for: A monumental vestibule and gallery. A board-room of 1,500 square metres in which the reserved enclosure for the brokers should be located, and in direct communication with this hall for the transaction of business. A large room for registering quotations. Room for the messengers of the stock brokers. Several rooms for the reception of customers, others for different categories of intermediaries connected with the building. Telegraph and telephone offices. All these dependences should have easy outside access. Police station, cloak-rooms, lavatories. On the floors above, location of offices pertaining to the stock exchange and for members.

The military club should comprise: Vestibule, custodian (concierge), waiting-rooms, parlors for strangers, grand staircase, secondary staircases. Salle de Fêtes, for balls and concerts, several parlors, billiard-room, reading-room, card-rooms, etc. Large dining-hall, and several for small parties. Study rooms, library, lecture-hall and museum. Salles d'armes, with accessories. Several apartments for general officers. Lodging-rooms for officers. Bath-rooms and hydrotherapy. Large covered swimming pool. Quarters for the clerk and employés. Stable for twenty horses. Kitchen, linen-rooms and dependences. Telegraph and telephone offices. Garden, terraces, etc.

The art club should comprise: Vestibule, covered carriage entrance, custodians, parlors for strangers. Carriage-room for automobiles. Grand staircase and secondary staircases. Large parlors, reading-rooms, card-rooms, etc. Salle de Fêtes for concerts and theatrical representations, with 800 seating capacity. Stage, dressing-rooms, accessories, etc. Exposition galleries for painting and sculpture, with special entrance for strangers. Fencing and hydrotherapy. Cloak-rooms. Large dining-hall and several of lesser importance. Library and study rooms. Kitchen, linen-rooms, etc. Lodgings for a few club members, others for the clerk and employés. Telegraph and telephone offices. Garden, terraces, etc.

The greatest dimension of the ground occupied by the place, buildings and club gardens must not exceed 350 metres. The avenue, 40 metres in breadth and also a portion of the bridge should be indicated on the drawings.

Required plan at a scale of 0.002 to the metre.

Two drawings showing the composition of the place, and a section of the stock exchange at a scale 0.004 to the metre.

FIRST-SECOND GRAND PRIX DE ROME, BY M. WIELHORSKI.

Additional Illustrations in the International Edition.

THE NAVE: ALL SAINTS', DORCHESTER, MASS. MESSRS. CRAM, WENTWORTH & GOODHUE, ARCHITECTS, BOSTON, MASS.

THE REREDOS IN THE SAME CHURCH.

THE BISHOP'S CHAIR IN THE SAME CHURCH.

DOORWAY: NO. 18 EAST 54TH STREET, NEW YORK CITY.

HOUSE AT WHITNEY AVE. AND WILLOW STREET, NEW HAVEN, CONN. MR. J. W. NORTHROP, ARCHITECT, BRIDGEPORT, CONN.

THE FAYERWEATHER, NEW HAVEN, CONN. MESSRS. CADY, BERG & SEE, ARCHITECTS, NEW YORK, N. Y.

THE SKULL AND BONES: YALE COLLEGE, NEW HAVEN, CONN. MESSRS. ROBERTSON & POTTER, ARCHITECTS, NEW YORK, N. Y.

NOTES & CLIPPINGS

FIREMEN AND LIVE WIRES. — Heincke, in the *Electrische Zeitschrift*, gives a description of experiments made to ascertain whether there is any danger, and if so how much, of firemen being exposed to shocks by the stream of water which is thrown from the hose striking against a live wire. The author experimented with ordinary hydrant water, which in his case was not a very good conductor, and also with water to which was added five-tenths per cent of soda to make it conduct better. The copper nozzle of the hose was very well insulated from earth and the potential of the stream of water against the earth was measured with precision voltmetres. From these potentials he calculated the current strength, based upon the resistance of the human body of 15,000 ohms, as ascertained by Professor Weber in Zurich. Experiments were conducted with tri-phase current of 6,000 volts and 125 volts, and direct current of 240 volts and 550 volts with both kinds of water mentioned above. The experiments with tri-phase current were conducted with star connection, 6,000 volts between two lines, the neutral wire being earthed. The places where the stream of water struck the wires had been previously bared. It was shown that with ordinary water a length of the stream of 300 mm. is sufficient to render the effects of the electric current on the body harmless, while with five-hundredths per cent soda in the water the minimum length is 1,000 mm. It is to be remarked, however, that disagreeable sensations show themselves in the body of the person under consideration. With 550 volts direct current and pure hydrant water a dangerous potential was also not obtained, but with the good conducting water it showed itself at a distance of 80 mm. It is shown by these tables that the danger resulting from the playing of water on current-conducting wires is not by far so great as had previously been thought and feared, especially if it is considered that perhaps only in the rarest cases will wires which carry a potential of three times 6,000 volts come into consideration. — *Electrical World and Engineer.*

THE WALLS OF AVIGNON. — One is glad to hear that there is still some prospect of the preservation of the walls of Avignon. That charming city has already suffered enough at the hands of the utilitarian. The French Government has made barracks of the papal palace, cutting out the pointed windows, for sanitary reasons and, which perhaps is kind, covering those frescos which survived the brutality of the soldiers — with whitewash. Then a political person, M. Pourquery de Boisserin, who had become *maire*, tried to curry favor with the ignorant of his electorate by demolishing the mediæval ramparts, among the most beautiful and best preserved of their period in existence. He attacked two of the gates, but, happily, he has now been defeated at the election and is ousted from his office. We thought that they had in France a ministry of fine-arts which might have prevented this sort of thing, and we have heard it spoken of at times as a model for our use. But either it is wofully careless, pitiably incompetent, or, worst of all, too susceptible to political influences. In any case Avignon keeps its walls, and from the towers of Villeneuve, across the river, you may conjure up, with little effort of the imagination, a vision of the days when the bridge of St. Benazet might still be danced on. — *London Morning Post.*

SOME ART STATISTICS. — A return has just been published in connection with the importation of works of art into the United Kingdom, showing that France is responsible for the chief supply. During the year 1902 the United Kingdom imported "pictures and drawings by hand" (as the revenue authorities describe them) to the total declared value of £322,718. No less than £166,500 of this amount came from France in 5,916 items, the next countries in order being Holland, £61,165, and Belgium, £54,910. In these days of false "tiaras" and dubious Corots and Daubignys, one may make a shrewd guess that the thriving manufacture of "old masters" is responsible for no little of this special branch of trade. The imports of "works of art other than pictures" were valued at £237,200, France again heading the list with £123,994. The exports totalled £288,454 for pictures, France taking £85,447. — *Paris Daily Messenger.*

PRESERVING A TINTORETTO. — The great canvas by Tintoretto on the wall of the Grand Council Chamber in the Doge's Palace at Venice, over the Doge's throne, has been carefully removed and laid on the floor preparatory to having a new canvas substituted. It is 22 feet high and 68 feet long, and represents "Paradise." Tintoretto painted it in 1590, when but a few years beyond his "teens." The wall underneath was found in a bad state. Part of the old frescos, painted two centuries earlier by Guariento, was found in place where it had escaped a conflagration which nearly ruined the palace in the sixteenth century. — *N. Y. Times.*

AN ARCHITECTURAL SURVIVAL. — Bow Church, to the rectory of which Mr. Hutton, the late librarian of the National Liberal Club, is being instituted, possesses what Darwinists would call a "survival." This is the curious balcony beneath the clock, which represents the mediæval tower from which the court witnessed the tournaments in Cheapside. It was originally a wooden structure, which on one occasion collapsed, so that Queen Philippa and all her ladies "fell with great shame" on the heads of the assembled knights. Jerry-building was discouraged in those brave days, and the careless carpenters were ordered to be executed. The royal balcony was last used by Queen Anne in the first year of her reign at a "pageant" devised by the "City Poet," Elkanah Settle. — *Westminster Gazette.*

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